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## Table of Contents

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### ORIGINAL ARTICLES—

	PAGE.
"Observations on the Treatment of Laryngeal and Associated Malignant Disease", by R. KAYE SCOTT, M.D. . . . .	287
"Child Guidance Work in a Public Hospital", by JOHN F. WILLIAMS, M.D., M.R.C.P., D.P.M. . . . .	294
"A Comparison of the Vernes and Wassermann Tests in Routine Hospital Work", by HENRY SHANNON, M.D., D.P.H. . . . .	299

### REPORTS OF CASES—

"Bronchopneumonia Treated by Oxygen-Carbon Dioxide Inhalation", by F. A. MORRISON, M.B., Ch.M. . . . .	303
"Acute Mastoiditis", by ARTHUR MURPHY, M.B., Ch.M. . . . .	303

### REVIEWS—

Mental Deficiency . . . . .	304
Nurses and Pathology . . . . .	304
Discharge From the Ear . . . . .	304

### LEADING ARTICLES—

Immunization against Diphtheria . . . . .	305
---	-----

### CURRENT COMMENT—

	PAGE.
The Central Nervous System and Peptic Ulcer . . . . .	306
The Treatment of Anthrax . . . . .	307

### ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

Medicine . . . . .	308
--------------------	-----

### BRITISH MEDICAL ASSOCIATION NEWS—

Nominations and Elections . . . . .	310
-------------------------------------	-----

### CONGRESSES—

The Australian and New Zealand Association for the Advancement of Science . . . . .	310
---	-----

### DIARY FOR THE MONTH . . . . . 316

### MEDICAL APPOINTMENTS . . . . . 316

### MEDICAL APPOINTMENTS VACANT, ETC. . . . . 316

#### OBSERVATIONS ON THE TREATMENT OF LARYNGEAL AND ASSOCIATED MALIGNANT DISEASE.<sup>1</sup>

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THIS paper is based on a review of all cases of laryngeal and lower pharyngeal malignant disease treated with Commonwealth radium at the Melbourne Hospital Radiotherapeutic Clinic during the last three years. The paper will centre on the types of malignant disease presenting, the problems that arise in their treatment, and the methods of treatment that have been used. Finally, the results of treatment and the lessons deduced therefrom will be considered.

No record of brilliant result is presented; rather, the record is one of failure. But against this record must be set, in the large majority of cases, the advanced nature of the lesion and the virulence of the neoplasm. Obviously, techniques have been inefficient to cope with the disease, and effort has been made to improve the methods of treatment where clinical experience has shown this to be possible. These problems and the methods used in attacking them will therefore be discussed.

A moment would not be wasted in first considering the incidence of malignant disease in these situations.

In Australia, during the period 1908 to 1923, 625 deaths were certified as due to laryngeal malignant disease (see Table I). This represents just 1% of the total cancer mortality. Of the number of patients 89% were males. It is pointed out that the figures are probably low, as the details of

<sup>1</sup>Read at the Third Cancer Conference, Canberra, March, 1932.



TABLE III.  
Group I.—Endolaryngeal Carcinomata.

Name.	Number.	Classification.	Glands.	Primary Treatment.	Gland Fields.	Duration of Symptoms.	Result.
D.	464	Borderline.	Nil.	Partial thyroidectomy and radon.	Pack.	Eighteen months.	Locally well. Died in eighteen months of secondary deposits.
N.	594	Inoperable.	Nil.	Partial thyroidectomy and radon.	Pack.	Twenty-four months.	Well eighteen months later. (Superficial necrosis.)
A.	759	Operable.	Nil.	Partial thyroidectomy and radon.	Nil.	Two months.	Well one year later.
Dn.	845	Borderline.	Nil.	Partial thyroidectomy and radon.	For pack.	One year.	Well ten months later.

radiation. They are small and need not be removed, complete closure of the wound thus being allowed. They can readily be stitched on to the exposed inner layer of muco-perichondrium and retained accurately *in situ*. There is little fear of cartilage necrosis, as the cartilage is widely removed from the area, and it is not necessary to hold the seeds in position as in the case of radium needles. On the other hand, seeds are less fully screened and allow some  $\beta$  rays to pass into the tissues. The initial strength is calculated to give a therapeutic dose of radiation to one cubic centimetre of tissue during the period of activity. Seeds are made of pure gold, 0.3 millimetre in thickness and about five to seven millimetres in length, and of 1.5 millicuries initial strength.

The irradiated field is thus more extensive, and the radiation more homogeneous and less intensive. The possibility of doing without a tracheotomy was considered, and latterly tracheotomy has been omitted. The patient has been kept absolutely at rest during the reactionary period, to prevent possibility of any flare-up arising from laryngeal infection during this period of active inflammation. The view is held that tracheotomy may be performed at any time should necessity arise. When an ulcerating malignant focus exists above a tracheotomy opening, intense tracheitis and bronchitis are extremely common and very unpleasant complications, and every opportunity should be taken, therefore, to avoid this operation if circumstances at all permit.

The above method appears to be quite satisfactory, and has given good results so far.

In one case of subglottic malignant disease, a combination of cartilage resection and laryngofissure was performed. This growth was a sarcoma, and will be discussed more fully at a later stage.

The cartilage resection is adequate to deal with subglottic growths, provided there is no extension below the level of the cricoid. No evidence of laryngeal collapse has appeared following removal of the whole of the thyroid ala. In one case (594) there was a late radionecrosis of the overlying soft tissue. This appeared twelve months after the initial radiation, which was supplemented by radiation of the gland fields by a pack.

The question of secondary metastasis is of definite interest in cord lesions.

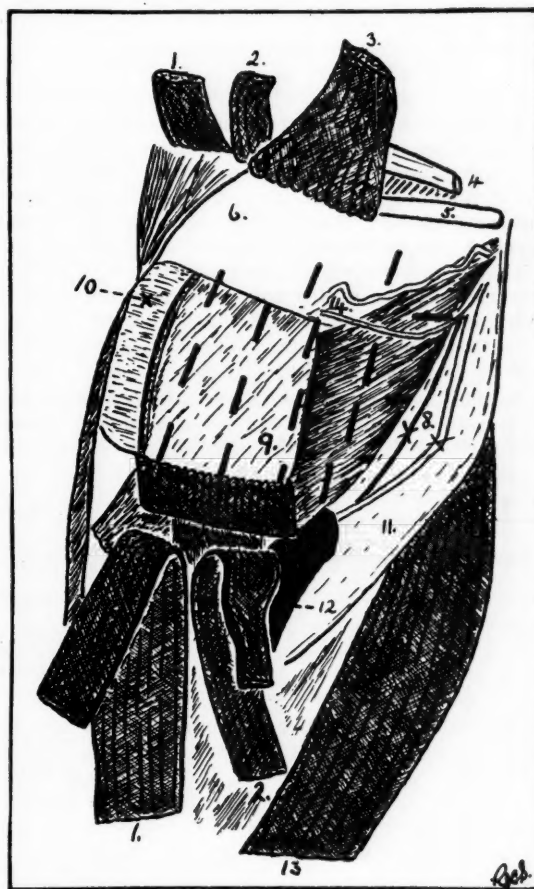


FIGURE I.

Dissection illustrating surgery of access to endolaryngeal or lateral pharyngeal neoplasms. Radon implants *in situ*. The posterior part of the ala of the thyroid cartilage with the cornua has been removed, leaving the inner layer of the muco-perichondrium intact. 1 = sternohyoid muscle, 2 = omohyoid muscle, 3 = thyrohyoid muscle, 4 = digastric muscle, 5 = hyoid bone, 6 = thyrohyoid membrane, 8 = external laryngeal nerve and superior thyroid artery, 9 = inner muco-perichondrium, thyroid cartilage, 10 = thyroid cartilage, 11 = pharyngeal fascia (reflected), 12 = thyroid gland, 13 = sternomastoid muscle.

The nature of the lymphatic drainage of the cords explains the comparative rarity of glandular dissemination, but subglottic involvement tends to allow dissemination into a group of glands lying among the lower infrahyoid musculature. The necessity for irradiation of the cervical areas must be stressed, therefore, for two reasons: (i) The further radiation from the pack may cause a lethal dose to be delivered to an incompletely irradiated area of the primary. (ii) The possibility of extension to lateral or anterior cervical glands.

Case number 464 of the series showed the dissemination to the anterior cervical glands which occasionally follows subglottic involvement. This appeared sixteen months after the initial radiation. A pack was applied to the neck, but was made in two halves, and the anterior half of the neck, particularly the suprasternal notch, received but little radiation.

This recurrence, therefore, teaches very definite lessons: that a pack should be applied in all cases, that it should be bilateral, that it must certainly include the lower anterior cervical areas.

#### Hypopharyngeal Carcinomata.

In the hypopharyngeal carcinoma group five cases are included (see Table IV). In all very advanced primary lesions were present. Three patients had no obvious gland involvement and two had very advanced glands. The duration of symptoms varied between two and eighteen months, and the patients with the most advanced lesions gave the shortest histories. Three of the five patients were females. With one exception, needles were buried directly into the primary growth with an endoscope when radium was considered applicable.

In one instance only was treatment of any avail.

Obstruction in this case had necessitated both tracheotomy and gastrostomy before the patient came to the

radium clinic. Needles were buried directly and a bilateral cervical radium pack followed. The lesion apparently cleared, allowing closure of both gastrostomy and tracheotomy openings, but in twelve months there was a recurrence. Further treatment along similar lines allowed a further period of twelve months' palliation before the onset of fatal recurrence.

Later consideration will show that the direct burying of needles into a lesion with an endoscope is a highly unsatisfactory proceeding.

The advanced nature of the growths in the patients presenting themselves makes effective treatment very difficult.

External radiation, alone, either from mass apparatus or "two-centimetre" pack, is insufficient to cause resolution, and interstitial radiation is certainly necessary.

In the most recently treated case gastrostomy was performed and was followed by a two-stage lateral pharyngotomy. The first stage consisted in an exposure of the pharyngeal wall of the same side, with resection of the thyroid ala. At the second stage of the operation the growth was found to be very extensive and irradiation was incomplete. The patient died.

#### Epilaryngeal Carcinomata.

Four cases of the series are included in the epilaryngeal carcinoma section (see Table V). Two showed very advanced primary lesions and two moderately advanced. Glandular involvement was present in three instances. The average duration of symptoms was six months. No patient survived for more than six months.

Laryngofissure allowed indirect introduction of radium in two instances, but the radiation was obviously inadequate and caused no useful result.

A patient has recently been treated by following gastrostomy with a two-stage lateral pharyngotomy. The mistake was made of approaching the pharynx

TABLE IV.  
Group II.—Hypopharyngeal Carcinomata.

Name.	Number.	Classification.	Glands.	Treatment.	External Radio-therapy.	Duration of Symptoms.	Result.
C.	75	Very advanced.	Nil.	Radium needles inserted into primary growth with endoscope. Tracheotomy.	Mass radium treatment later (4 gramme bomb)	Eighteen months.	Dead in six months. "Not improved."
D.	113	Very advanced.	Nil.	Radium needles inserted into primary growth with endoscope. Repeated one year later. Tracheotomy. Gastrostomy.	Pack.	One year.	Palliation for one year. Recurrence. Palliation for a further twelve months.
Cl.	373	Very advanced.	Very advanced.	Radium needles inserted into primary growth with endoscope. Tracheotomy.	Deep X ray therapy.	Six months.	Dead in six months. "Not improved."
Ck.	378	Very advanced.	Very advanced.	Exploratory laryngofissure. Tracheotomy. Mass treatment.	Mass radium to primary growth and glands.	Six months.	Temporary improvement. Dead in six months. "Not improved."
Y.	1063	Very advanced.	Nil.	Gastrostomy. Lateral pharyngotomy. Radon seeds.	Nil.	Two months.	Dead in six months. "Not improved."



TABLE V.  
Group III.—Epilaryngeal Carcinomata.

Name.	Number.	Classification.	Glands.	Treatment. Primary-Secondary.	Duration of Symptoms.	Result.
F.	79	Very advanced.	Operable.	Mass radium. Tracheotomy.	Five months.	Dead in six months. "Not improved."
N.	292	Inoperable.	Border line.	Laryngofissure. Radium needles inserted into primary growth, pack applied to glands. Tracheotomy.	Six months.	Local improvement. Death in six months. "Not improved."
D.	294	Very advanced.	Inoperable.	Laryngofissure. Seeds into primary growth. Radium needles inserted into glands. Tracheotomy.	Seven months.	Death in six months. "Not improved."
Y.	1012	Inoperable.	Nil.	Gastrostomy. Lateral pharyngotomy plus radon.	Six months.	Died. ? Opium poisoning. "Not improved. Died."

from behind the carotid sheath. The patient, an old opium addict, was found dead in an opium den two days after discharge from hospital. In future similar cases will be attacked by a two-stage pharyngotomy from the sound side, but in front of the sheath. It must be stressed that such proceedings necessitate three operations which are a severe strain on any patient with an epilaryngeal malignant condition. Bronchitis is an almost invariable accompaniment of a septic pharyngeal lesion. It is therefore very unwise to attempt any serious treatment in a case which is at all advanced. No useful or even palliative result of consequence has followed methods in these first three cases. No hesitation is therefore being shown in submitting a patient with a relatively early growth to severe operative procedures.

#### Lateral Pharyngeal Malignant Disease.

The group of lateral pharyngeal malignant disease deals almost exclusively with lesions arising

in the pyriform fossa. In this series there are fourteen cases (see Tables VI, VII, VIII). Therefore it appears to be the most common situation in the region of the laryngopharynx in which malignant disease originates.

Closer examination reveals interesting information. Patients are seen to report relatively early, but almost invariably the lesions are found to be extensive. Of fourteen patients five give a history of three months or less; six give a history of six months or less; two give a history of twelve months or less; one gives a history of eighteen months. Of the whole series only three fall outside the group with "very advanced" primary lesions.

Looking next to the incidence of secondary metastases at the initial examination we find that four patients (of 14) had no obvious gland involvement; three patients had "operable" glands; in two the condition was classified as "borderline"; three patients had definitely "inoperable" metastases;

TABLE VI.  
Group IV.—Lateral Pharyngeal Carcinomata.  
Subdivision A. Cases in which radium needles were buried directly into the primary lesion with an endoscope.

Name.	Number.	Classification.		Treatment.		Duration of Symptoms.	Result.
		Primary.	Glands.	Primary.	Glands.		
R.	69	Very advanced.	Bilateral, possibly of septic origin.	Needles voided in two hours. Tracheotomy.	Pack.	Six months.	Died in six months. "Not improved."
Rs.	83	Very advanced.	Bilateral, inoperable.	Needles voided in two days (two occasions). Tracheotomy.	Pack.	Eight months.	Local improvement for six months. Then recurrence in primary growth glands and pelvis. Died in one year.
F.	93	Inoperable.	Nil.	Needles retained. Tracheotomy.	Pack.	Six months.	Well three years later.
By.	98	Very advanced.	Very advanced.	Laryngofissure. Needles from mass above and below. (Retained.) Tracheotomy.		Eighteen months.	Died in six months. "Not improved."
H.	120	Inoperable.	Nil.	Laryngofissure. Partial excision plus radium. Tracheotomy.	Pack.	Six months.	Well for one year, then recurrence of primary with extensive secondary growths.
D.	223	Very advanced.	Border line.	Needles voided in three days. Tracheotomy.	Pack.	One year.	Primary cleared. Died later of metastases.

TABLE VII.

Group IV.—Lateral Pharyngeal Carcinomata.

Subdivision B. Cases in which the primary growth when first seen was too extensive to allow needling to be considered.

Name.	Number.	Classification.		Treatment.		Duration of Symptoms	Result.
		Primary.	Secondary Growths.	Primary.	Secondary.		
S.	55	Very advanced.	Bilateral, borderline.	Distance radium treatment. Gastrostomy.	Pack.	Three months.	Died in six months. "Not improved."
M.	92	Very advanced.	Very advanced.	Mass radium treatment.		Three months.	Died of hemorrhage at start of treatment.
D.	160	Very advanced.	Nil.	Bilateral pack; subsidence and five months later seeds buried.		Four months.	Palliation for five months. Death six months later. "Not improved."

TABLE VIII.

Group IV.—Lateral Pharyngeal Carcinomata.

Subdivision C. Cases in which surgery of access was attempted. Radium implants were used.<sup>1</sup>

Name.	Number.	Classification.		Treatment.		Duration of Symptoms.	Result.
		Primary.	Secondary.	Primary.	Secondary.		
O.C.	369	Very advanced.	Bilateral, inoperable.	Partial thyroidectomy and seeds. Tracheotomy.	Nil.	Five months.	Associated tuberculosis. Died in one month. "Not improved."
C.	394	Very advanced.	Operable.	Partial thyroidectomy and seeds. Tracheotomy.	—	Two months.	Death under anæsthetic.
H.	590	Very advanced.	Inoperable.	Partial thyroidectomy and seeds. Tracheotomy.	—	Three months.	Cachexia. Post-operative death.
W.	720	Very advanced.	Operable.	Partial thyroidectomy attempted. Thyroid cartilage widely infiltrated. Seeds used locally.	—	Four months.	Died in one month. "Not improved."
R.	796	Inoperable.	Nil.	Partial thyroidectomy. Seeds. No tracheotomy.	—	Three months.	Local improvement. Died of secondary growths.

<sup>1</sup>This series is composed of all the cases of this class seen since February, 1930.

two patients had "very advanced" secondary deposits. Therefore, in regard to the secondary deposits only half the patients had even a chance, if the primary lesion were left out of the picture for the time being.

Thus the material presenting could not be regarded as promising. The series has been subdivided according to the lines of treatment adopted. These subdivisions are manifest.

(a) Cases in which radium needles were buried directly into the primary lesion by endoscopic methods.

(b) Cases in which the primary lesion, when first seen, was too extensive for needling to be considered.

(c) Cases in which surgery of access was attempted and peripheral radiation was used.

In the first subdivision are six patients, four with very advanced lesions and glandular secondary deposits, and two who had a more restricted area of primary involvement and who had no enlarged glands.

In the majority of the cases radium needles were buried directly into the primary lesion with an endoscope. This treatment was usually followed by

external radiation from a pack applied to each side of the neck. Only one patient retained the needles in position. The irritation of the needle threads and the frequent and unpreventable coughing invariably caused displacement before a useful dose could be administered. The correct orientation of needles during implantation through an endoscope is a matter of considerable difficulty, and no other conclusion can be reached but that this method of treatment is inadvisable.

Two patients had laryngofissure performed, and in one the growth was pedunculated and was removed with a snare and needles were placed into the base of the growth. This patient remained clear for twelve months before showing recurrence.

In one case only will apparent cure be effected, and this patient has been well for three years. Needles were retained following direct implantation. No glands were present, and a bilateral pack applied to the cervical region completed the treatment.

The second subdivision includes three patients in whom the malignant disease was so advanced that

palliative treatment only could be considered. It is very much a question as to whether such efforts are justifiable, but one of the patients had relief for five months before succumbing to the disease some six months later. It is evident that patients rarely report before the disease causes them considerable discomfort. No patient, except one in whom treatment has given temporary relief, has lived six months after this stage.

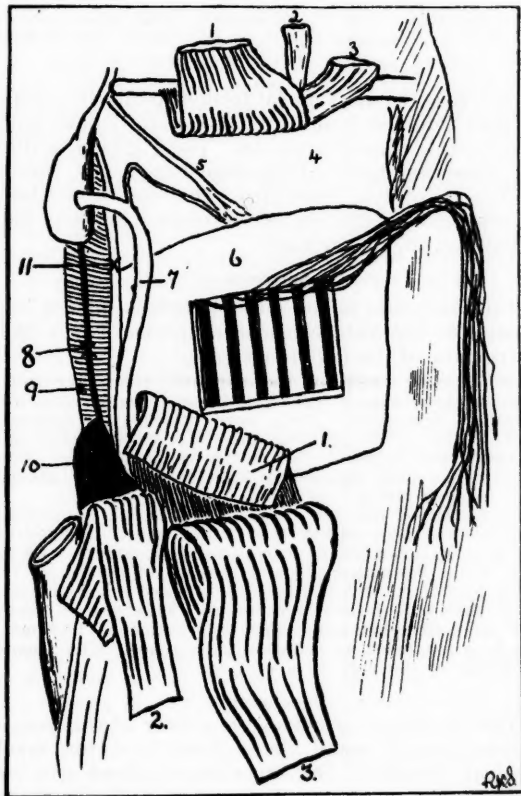


FIGURE II.

Dissection illustrating "fenestration" operation. With radium needles *in situ* (after Harmer). 1 = thyrohyoid muscle, 2 = omohyoid muscle, 3 = sternohyoid muscle, 4 = thyrohyoid membrane, 5 = internal right superior laryngeal nerve, 6 = thyroid cartilage, 7 = superior thyroid artery, 8 = external right superior laryngeal nerve, 9 = inferior constrictor muscle, 10 = thyroid gland, 11 = superior thyroid vein.

In subdivision (c) are cases in which surgery of access was attempted for external peripheral radiation. The series is an unfortunate one; four or five growths were very advanced, and on review no other conclusion can be drawn than that no surgical procedure should have been attempted. The rapidity of the malignant development is shown by the fact that symptoms in all cases are of a shorter duration than six months.

In considering possible methods of treatment, the conclusion has been reached that the direct implantation of radium by endoscopic means is an inadequate and unsatisfactory method of treatment and has given generally unsatisfactory results.

External radiation from a "two-centimetre" pack placed bilaterally in the absence of interstitial radiation has reduced the neoplasm; and in one or two cases has allowed subsequent interstitial radiation. This opens the question as to whether preliminary external radiation from a "three-centimetre" pack, greater distance being used to gain a greater depth dose, might not be worthy of trial in the more advanced type of lesion.

Laryngofissure proved of value on one occasion only, and here the pedunculated nature of the growth which arose from the upper part of the pyriform fossa, allowed partial removal of the tumour. However, tumours presenting such characteristics are rare. Strangely enough, two tumours of this kind were treated by similar means almost within the same week. One was an epithelioma, the other a sarcoma. One patient was well for twelve months before the onset of recurrence; the patient with sarcoma has been well now for two and a half years.

In an attempt to obtain more satisfactory radiation of the pyriform fossa, the work of Trotter and Harmer has been used.

Investigation showed that satisfactory radiation of a pyriform fossa could be obtained if the whole of the posterior part of the ala of the thyroid cartilage were resected, the inner layer of mucoperichondrium being left behind. As the fossa in question lies in part under cover of the wing of the cartilage, radium implants could be stitched on the external surface. The cartilage being removed, no risk of necrosis would present. To the cartilage the larynx owes much of its support, and collapse

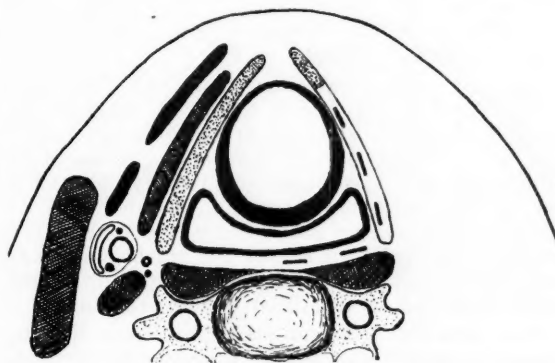


FIGURE III.

Diagrammatic cross section at level of larynx to show disposition of radon seeds following surgery of access for radiation of pyriform fossa malignant disease. (See text.)

is possible, but it was considered that the inner layer of the perichondrium attached indirectly above to the hyoid and epiglottis and below to the cricoid would be sufficient to maintain the normal shape, provided it were left intact. Its position is rendered more stable by the attachment of the inferior constrictor muscle passing to the posterior pharyngeal wall, and of even more importance, the insertions to the upper cornu of the stylopharyngeus and the palatopharyngeus muscles. Both of these would

TABLE IX.  
Group V.—Sarcomata.

Name.	Number.	Group.	Classification.		Treatment.	Duration of Symptoms.	Result.
			Primary.	Secondary.			
C.	146	Lateral pharyngeal.	Border line.	Operable.	Laryngofissure. Excision and needles.	Two months.	Well two and a half years later.
R.	844	Endolaryngeal.	Inoperable.	Nil.	Laryngofissure. Seeds.	Six months.	Local improvement ten months later. Cachexia.

exercise considerable tension on the remaining membrane.

These two muscles are covered by the dense pharyngeal fascia, and if this be separated from the pharyngeal musculature at its attachment to the posterior border of the thyroid, a plane is opened which extends across to the opposite side of the pharynx and upwards to the base of the skull. Immediately at the posterior end of the thyrohyoid membrane, access is limited by the superior laryngeal nerve and artery. If definite necessity arose, these could be divided.

The opening of this plane allows the introduction of radon implants into the posterior pharyngeal wall, and so a lesion of the pyriform fossa can be radiated from both antero-lateral and posterior aspects. Thus a wide area can be given a homogeneous radiation, which is not readily possible when radium needles are used.

The pharynx is not opened, the area is thus kept aseptic, the implants are not removed, and the wound can be closed without the necessity of reopening to remove radium needles. There is no risk of cartilage necrosis.

Latterly even tracheotomy has been dispensed with. This is an added factor in maintaining aseptis, which is so important when foreign bodies are left in the tissues permanently. It has been considered that tracheotomy could always be carried out as an emergency operation, should signs of distress arise during post-operative or reactionary stages. So far the necessity for tracheotomy has not arisen in patients with endolaryngeal or lateral pharyngeal cancer submitted to this operation.

The patients are kept strictly at rest till the reaction subsides and healing processes are evident. A pack should be applied some three to four months after the initial operation, and again care should be taken to see that glottic œdema does not supervene.

For this proceeding it is necessary to select the patients. From the results tabulated it is clear that it is quite futile to subject patients with advanced lesions to such treatment.

An extensive primary visible with the mirror will almost certainly be even more extensive than it appears. If there be inoperable gland involvement or fullness of the larynx with tenderness of cartilage indicating malignant infiltration, any of these findings would contraindicate operation. In

such a case the most useful form of palliation would be that obtained from a distance radiation, as from a bilateral "three-centimetre" pack, giving a dose of three hundred milligramme-hours per square centimetre of field irradiated. This dose would have a very definite effect on any secondary deposits that might complicate the case.

#### Sarcoma.

The sarcomata of the series have been placed in a group for separate consideration (see Table IX). Sarcomata of the region are rare.

One tumour arose in the pyriform fossa, the other from a chondroma of the cricothyroid region, and was therefore subglottic. Both were attacked by laryngofissure. One in the pyriform fossa was pedunculated, and removal was followed by radium implantation. This patient has been apparently free of malignant disease now for two and a half years.

In the second case the growth was attacked by laryngofissure also, and growth was found widely infiltrating the subglottic region and cricothyroid membrane. Elevation of the sternothyroid and removal of portion of the lower part of the thyroid cartilage allowed radon implants to be buried in the involved tissues. This case is recent, and the patient has shown local improvement. Treatment has been concluded by radiation from a pack. The general condition of the patient is poor.

#### Conclusions.

This therefore concludes the survey of this series, which, though small, has given food for much clinical thought. The experiences gained and lessons taught must now be used to full advantage. The difficulties are many, but improved technique will bring better results. Thoughtful deliberation and carefully considered action will surely help in the attainment of these ends.

#### References.

- <sup>1</sup> M. J. Holmes: "Cancer Mortality in Australia", "Commonwealth of Australia: Department of Health, Service Publication", Number 30, 1925.
- <sup>2</sup> C. H. C. Searby: "The Incidence, Regional Distribution and Mortality of Malignant Disease at the Melbourne Hospital During the Years 1921-1928", "Health Cancer Supplement of the Commonwealth of Australia", November-December, 1929, page 2.
- <sup>3</sup> Chevalier Jackson, quoted by St. Clair Thomson and Colledge: "Cancer of the Larynx", 1930, page 33.

#### CHILD GUIDANCE WORK IN A PUBLIC HOSPITAL.

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It is proposed to show that there is a field of work of considerable magnitude and importance



which is to be regarded as within the sphere of the medical practitioner, but for which he is in many respects very badly equipped by his training. This field has been subjected to much investigation in recent years by medical men and women who are largely responsible for our increased knowledge of the whys and wherefores of childish behaviour.

A review of the patients attending the Psychiatric Clinic at the Children's Hospital, Melbourne, over a period of one year will serve to show the type of cases dealt with. This clinic arose in the first place from Professor R. J. A. Berry's interest in mental deficiency, and at first served the purpose of rendering available to the staff of the hospital the results of psychometric examination. Various tests of intelligence were employed, such as the Binet-Simon and Porteus series, and an attempt was made to correlate these with physical measurements of cranial capacity, vital capacity, stature, grip and so forth. This work has already been dealt with in various publications, for example, "Brain and Mind", and numerous articles in *THE MEDICAL JOURNAL OF AUSTRALIA* and *The British Medical Journal*.

Following the retirement of Professor Berry from the Chair of Anatomy, there was some reorganization of the clinic, with the idea of making it include other aspects of child behaviour besides those apparently due to mental deficiency.

The staff of the clinic consists of a psychiatrist and assistant, two psychologists and a social worker. It is therefore identical in composition with the child guidance clinics which are now established throughout America and Great Britain. A similar clinic on a self-supporting basis will, it is hoped, shortly be launched in Melbourne under the auspices of the Victorian Council for Mental Hygiene and the Vocational Guidance Association. In such a clinic the psychiatrist is concerned with the taking of a history of the child's development, the elucidation of emotional difficulties, an estimation of the degree of intelligence from the history of social adaptation, and a physical examination. The psychologist is concerned with an estimation of the degree of intelligence by means of psychological tests, and the social worker with investigation of

the home and school. With the results of these investigations at hand, a conference is held, at which all aspects of the case are examined, the relative importance of the various causative factors which may be at work are considered, and a line of treatment mapped out. This may entail certain changes of environment, a change of attitude on the part of the parents, or a direct approach to the child by medicine, advice, fresh interests or other therapeutic agents.

Satisfactory records of 142 new cases during the first year were available, and they have been classified according to the main complaint or complaints of those bringing the patients to the clinic, as it is hoped in this way to illustrate the fact that cases similar to those dealt with are of frequent occurrence and should form part of every practitioner's work (see Table I). The demarcation between disorders of personality, behaviour and habit is not clear cut and is adopted for the sake of convenience. Such habit disorders as thumb-sucking, for example, must always be regarded as in some measure due to personality disorder, and treated accordingly, not merely by directing the attention to the part by restrictive apparatus.

It will be seen that there is a very considerable group of patients requiring help, and this help is urgently needed, for as a general rule it is only when children have proved refractory to ordinary home and school methods of treatment that they are brought to the hospital.

It may seem that many of the complaints do not rightfully belong to the sphere of medical work, but it is becoming increasingly realized that in dealing with such troubles, medical training and knowledge are often essential, though other social agencies may be required in diagnosis and treatment.

Nervous and mental disorders are freely admitted to be within the scope of medical work, although the amount of time spent on these subjects in the curriculum of most training schools is quite inadequate. In addition, the materialistic conceptions of a static organism which are only too often regarded as a firm foundation for medical training, leave the student quite unfitted to grasp the importance of the social environment, which is so potent

TABLE I.

Disorders of Personality.	Behaviour Disorders.	Habit Disorders.	Sleep Disorders.	Retardation.
Excitable, highly-strung, 34	Difficult to manage, 45	Enuresis, 35	Night starts and terrors, 7	Walking, 20
Obstinacy, 14	Tantrums, screaming fits, 19	Nervous habits, including masturbation, 25	Somnambulism, 3	Talking, 57
Solitary, 11	Wandering and truancy, 21	Speech disability, stammering, 24		School, 65
Hypersensitive, 9	Stealing, 14			
Timid and too dependent, 10	Other delinquencies, 2	Epileptic manifestations, 26		
Change of personality, 2	Pugnacious, 6			
Self-conscious, 1	Head-banging, 5			

in moulding behaviour and which is responsible for most of the difficulties apparent in work of this nature.

Whether the child be brought to the clinic for delinquency, such as truancy, or stealing, disabilities such as stammering or enuresis, or some disorder of sleep, it will be found that the consideration of the reaction of the child to home and school environment will often lead to the root of the trouble.

Moreover, disorders such as these lead to social difficulties in the future, and it is felt that a great deal of adult nervous and mental disorder, criminality and antisocial activities may be prevented by treatment of childish disorders.

It is, of course, undoubted that bodily defects play a considerable part in causing troubles such as those discussed in this article, and to some extent the patients enumerated must be recognized as selected, as they have practically all been through a medical or surgical clinic before being referred for an opinion. If ordinary medical treatment has proved efficacious, further investigation by the psychiatrist has generally been regarded as unnecessary, so that it is certain that a greater proportion of children presenting behaviour problems will have some contributing bodily disorder than appears from attendance at the clinic. If bodily abnormality is present, the effect of this may be indirect, and the child's emotional reaction to the defect or disorder is often of great importance.

When the organic basis may be regarded as satisfactory, it is found that there still remain other aspects to be investigated, namely, the intellectual and emotional development of the child and its relationships with its social environment.

TABLE II.

Showing Cases Classified According to Degree of Intelligence.

Condition.	Number.
Retardation thought due to ill-health ..	6
Bright .....	5
Normal .....	32
Dull .....	37
High grade defective .....	35
Low grade defective (idiot or imbecile) ..	18
	<u>133</u>

The rather large proportion of those attending and showing mental retardation or deficiency is partly explicable on the grounds that such patients had been the main interest of the former Director of the clinic, and that it was some time before other types were referred.

There is, however, no doubt that the child of sub-normal mentality will always form a large percentage of such a series of patients, owing to the difficulties of adaptation associated with such a condition. The degree of intellectual development may be estimated in a measure by the position in school, and general behaviour, but additional information can be obtained by the use of intelligence tests. These are almost innumerable, and exaggerated claims in the past have been made for their utility. It is, however, undoubted that the use of serial tests, such as the Binet-Simon, Porteus or

Kohs can give great assistance in determining the intellectual level. This investigation is of importance, as one great source of emotional stress and resulting misbehaviour is the habit of expecting too much from a child of dull mentality. The constant failure and feeling of inadequacy lead to lack of effort, discouragement and antisocial feelings, which may in turn lead to faulty behaviour of the most varied kinds. Mental retardation and defect are not alone sufficient to cause these troubles, but if the child has to compete with normal children in the normal school and home environment, trouble frequently arises. The legend of the mental defective as a hopeless criminal with inborn vicious traits that are quite uncontrollable, has been exploded by the experience of many, that with proper care and supervision the majority are quite capable of becoming useful, happy citizens.

In the fourteen cases of stealing recorded, three children were classed as high grade defectives, three were of dull mentality, and the remainder normal or bright.

On the other hand, the bright child that is expected to spend its time on problems and tasks that it has already mastered with ease, is also liable to get into serious trouble, which is as a rule more difficult to detect, so that its antisocial career may be of much longer duration and of greater harm to the community.

In the past, disputes have arisen over the best criterion of mental deficiency, and especially in America the intelligence quotient (IQ), that is, the ratio of the mental age as determined by serial tests to the chronological age, has been used as a standard. Thus, if a child has an intelligence quotient of less than 75, he has been assumed to be mentally deficient or feeble-minded; if less than 50, to be an imbecile; or if less than 25, to be an idiot. It is regarded as an axiom that if during early childhood it is found that a child has an intelligence quotient of, say, 60, this will remain constant throughout life, and in spite of exceptions, the rule is a very useful generalization. Opposed to this criterion are the views of Tredgold and others, who have made the capacity for social adjustment the test of deficiency, and in spite of difficulties in determination, it is now being accepted as the only logical test. It has been found that many adults with an intelligence quotient of less than 75 are self-supporting, while others with an intelligence quotient above 75 are social failures.

The definition that is most widely used is that mental deficiency is incomplete mental development of such a kind and degree that the individual is incapable of adapting himself to the normal environment of his fellows in such a way as to maintain existence independently of supervision, control or external support. In this definition there are several points to be mentioned. Incomplete mental development may be of various kinds, and the fault may lie in the emotional as well as in the intellectual sphere, and even in the latter the defect may seem to be isolated to one function amongst many, for

example, word deafness or blindness. It is in the detection of these isolated defects that intelligence tests have considerable value.

In the second place, the degree of development depends to some degree at least on the influences to which the child has been subjected, and in some homes and schools there seems to be marked inhibition of development due to fear or lack of opportunity and encouragement.

Until suitable training has been instituted it is often impossible to say that the person is incapable of adaptation, and experience in training schools and colonies has shown that in many cases the capacity for adaptation seems to have been lying dormant. In spite of the excellent work done by the educational and lunacy authorities in the formation of special schools, classes and institutions for retarded and deficient children, much still remains to be done in this direction and in the provision of occupational training and supervision in later life.

The third point is the question as to what is the normal environment, for the requirements of the environment vary in differing social spheres, and also in different economic conditions. For example, in the present depression it is found that a very big percentage of the population requires external support in the way of sustenance. Some of these persons are to be regarded as subnormal in intelligence and as being the weakest who have been pushed to the wall. Only a small percentage of them would, however, be regarded as mentally deficient, for in normal times they are capable of maintaining independent existence.

Moreover, if the child comes of parents of good social position, but is of subnormal intelligence, he may be regarded as deficient, while in a lower social grade he may be quite capable of routine manual work and be self-supporting therein.

It will be seen that the social test is difficult to apply, especially to children, and that the results of intelligence tests are of great value as evidence in this respect.

Under these circumstances it will be seen that when one is faced with a subnormal child, the question as to whether he is or is not to be regarded as a high grade mental defective can often be decided only in a tentative fashion, though the recognition of gross degrees of deficiency is generally not difficult. Legal certification is at present confined to lower grades, that is, to imbeciles and idiots.

The intellectual and emotional aspects of mental life can never be completely separated, for, as already mentioned, the emotional development may depend on reactions towards the environment brought about by intellectual subnormality or supernormality, and the intellectual development may be greatly hindered by influences such as fear or discouragement. The condition of relatively few of the patients dealt with in this series could be explained solely on the grounds of an intellectual

defect, and in the great majority the emotional disorder was of great significance.

The question of the existence of an emotional deficiency or abnormality existing from birth in the same way as an intellectual deficiency cannot be answered satisfactorily, for in many apparently typical cases of constitutional psychopathy, moral imbecility and so forth, the faulty environmental influences are obvious. As a working rule, these diagnoses should as far as possible be avoided, but in some cases (thirty-nine in the present series) they are forced upon us by lack of therapeutic response or ignorance of causative factors. The degree of such an abnormality varies widely, but in each of these thirty-nine cases there seemed to be a fairly well marked inborn tendency towards emotional disability. Such a tendency may, of course, be inhibited or aided in its later development by environmental influences which are to be found in many spheres.

There seems to be no doubt that the type of emotional reaction or temperament is largely determined by the innate constitutional make-up in which the endocrines figure largely. The dull, sluggish, lumpish individual, and the quick-witted, restless and lean individual are very suggestive of under or over development of the thyroid, and this is to some extent borne out by the benefit derived from thyroid therapy in some instances.

The period of puberty and adolescence is, of course, a time of emotional instability, and it is during this period that the strain of adaptation to the environment, with the fresh interests in sex that arise, becomes very much greater and may give rise to behaviour problems in those who previously seemed stable. The frequency of masturbation amongst boys and girls at this period is very difficult to estimate, but there seems no doubt that it is extremely common. Faulty handling in the way of directing attention to the habit, restrictive apparatus, punishments and so forth, may lead to the perpetuation of what otherwise is generally a passing phase. The fear resulting from threats of insanity, together with the discouragement of failure to control the habit at once may result in great emotional distress and even tend towards the psychoses of adolescence. Suitable investigation, explanation, encouragement and other interests, on the other hand, generally lead to the cessation of the habit.

The importance of stammering and the handicaps resulting from its presence have been dealt with recently in this journal, and the necessity for taking a broad view of the environmental setting and its effect on the child need only be mentioned. The same breadth of view is essential in dealing with the other complaints enumerated, and even in regard to epilepsy it is thought that the influence of the environment plays a part in precipitating the attacks in some cases, and its modification may be of considerable value in treatment.

Wandering from home and truancy are of considerable interest, and the "pathological wanderer"



who at times figures in the daily Press, offers a very difficult therapeutic problem, as it seems impossible to conceive of any environment that offers to some members of this class the same attractions as the open road. Even our limited experience has, however, indicated the truth of the statement that "truancy is the kindergarten of crime", and in some cases the treatment has apparently been satisfactory when the causative factors can be modified.

Enuresis bulks very largely (25%) in the complaints for which children attend, and it is often discovered when other nervous complaints, for example, night terrors, antisocial activities and so forth, are the main reasons for bringing them to the clinic. Here again it is found that encouragement, possibly with use of a chart indicating the good nights, will often work like a charm; though in others the trouble is more deep-seated, requiring psychological investigation into the attitudes of the child and those around, before satisfactory results are obtained. The rôle of other factors, such as *Bacillus coli* infections, excessive drinking and so forth, must, of course, be considered, but not to the neglect of the emotional factors.

In some cases the enuresis undoubtedly serves a "useful" purpose for the child in prolonging the period of maternal attention, and may be a reaction against the arrival of a more favoured younger member of the family. In others, fear of the resulting punishment *et cetera* may alone be quite sufficient to bring the enuresis about, for the bladder is extremely sensitive to emotional stress, as is also the secretion of urine.

Whatever the mode of causation, there is no doubt that the presence of enuresis is a very big barrier in the path of healthy emotional development. The change in the outlook of the child who has regarded itself as a hopeless bed-wetter, bound down to a mattress reeking with urinary deposits, but who has been shown a more cheerful side of the picture, is often quite dramatic.

General ill-health plays an important part in hindering emotional development, inasmuch as this will lead to lack of outside company and too much leaning on the parents. The child to whom a sickness means much pampering and the release from unpleasant tasks at school or at home, will be lucky to escape neurosis in adult life. Whatever one's psychological knowledge and beliefs, whether one leans towards Freudian or behaviouristic doctrines, there is no doubt that the attitude of the parents towards the child and that of the child to the parents mean a great deal for the emotional future of the child. We often feel at the end of a long afternoon in the clinic that the parents are much more to blame than the children; and such complaints as "difficult to manage", "tantrums", "screaming fits" and so forth, often bring forth a history of a home environment in which even the most stable child would have a difficult task to make a satisfactory adaptation.

Amongst the parents who place obstacles in the way of healthy development are: those who believe

in the use of severe punishments with the idea of making the child obey their own selfish and unjust commands, or who make a fetish of household tidiness, so that any childish litter is avoided; those who criticize or praise the child in front of their friends and relatives, and are constantly squabbling in front of him about whether he should or should not do this or that; those who believe that questions regarding sex can be easily settled with old legends of storks and cabbages, or if not, by instructions never to think about such things; and those who show a marked preference for one member of the family, or a perpetual state of anxiety regarding the welfare of their children; and so the list could be extended. The position of the family is of importance in this connexion, but the effects of this can be much modified by suitable handling. Thus the only child can be placed in the way of companions of its own age, the elder child can be notified of the approach of another baby and given an interest in it, instead of being suddenly deposed from its position in favour of a strange bundle of napkins, tears and screams, and the young boy can be prevented from lording his father's preference and ambition for him over his elder sisters.

The home should offer opportunities for interest and occupation, and this is easily provided by garden plot, a few boxes, planks, blocks, bits of string *et cetera*, but the need will vary with the different ages of children. Expensive, easily broken toys are generally useless in this direction. As the child grows, the benefit of clubs, and of organizations such as those of boy scouts and girl guides should be stressed, as companionship of this kind is seldom harmful and often indispensable to healthy development. Bad companions may, of course, be found, but this danger and many others may be minimized if an attitude of confidence in the parents has been maintained.

This maintenance of confidence can generally be managed by the adoption of a truthful answer to all problems, by sympathy in their troubles and by pride in their success, by the avoidance of foolish threats that cannot or are not carried out, and by the lack of harsh and unjust punishment for childish faults.

In dealing with the young child, the treatment adopted must be mainly indirect, by change in the attitude of those around, by provision of change of environment, of fresh interests and so forth, for the direct approach is often extremely difficult, even under more favourable conditions than in an out-patient clinic where time is very limited. Moreover, the ability of the child to withstand the stress of unwholesome surroundings is often extremely limited.

In some cases the causative factors seem fairly obvious, but it is necessary to realize that the obvious to the adult may not necessarily be of importance to the child, and for this reason a careful evaluation of possible factors should be made before drastic changes, such as removal from the



home to an institution, are advised. This evaluation is often extremely difficult. The obscurities of motivation of conduct, the complexity of the child's mind, and the difficulties of approach may make the reconstruction of behaviour a task of great difficulty, requiring an even more delicate technique than that necessary with the adult.

Those who, as I was in the past, are accustomed to think of the child's mind as an open book for all to read, with the causative factors of future ill-health and misdemeanour written large, will soon be disillusioned. Nevertheless, the seeds of future trouble are present and may generally be discovered if sufficient care is used. Early recognition of the difficulties is, of course, of great value in this, as in other fields, making remedial measures much easier, but unfortunately the trouble has often drifted for a considerable time before skilled attention is sought. In the meantime various measures have been tried and failed, and the trouble has become more deep-seated. Only too often the medical adviser has been consulted, but his ignorance and resulting lack of interest have rendered the advice given of little benefit. Well-meaning friends and relatives have also given their generally contradictory opinions, and the resulting chaos has led to hopelessness on the part of the parent, and to the perpetuation of the child's disordered behaviour.

The knowledge required for the giving of helpful advice is not extensive, and the rudiments could be introduced with ease into the medical curriculum, with resulting benefit to all concerned.

Interest in these disorders of childhood quickly follows on the acquisition of knowledge, and this again gives the patience required in handling despairing parents and stubborn children.

As previously stated, team work is advisable in dealing with these problems, but there is no doubt that the general practitioner, from his knowledge of the personalities in the home and the mode of life of the children, often has a privileged position from the point of view of treatment.

This type of work has been sadly neglected in the past by most of our profession, and is now being seized upon by educationists and lay psychologists, some of whom are taking full responsibility for diagnosis and treatment, in a field where many factors quite outside their knowledge play an important part.

In spite of this defect, however, such work will cease to be a function of the medical practitioner, unless steps are taken to fit ourselves to maintain the lead in this work, and it is in the hope that something in this direction may eventuate that this rather sketchy review has been written.

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#### A COMPARISON OF THE VERNES AND WASSERMANN TESTS IN ROUTINE HOSPITAL WORK.

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INTEREST in certain aspects of colloidal chemistry rather than any preoccupation with syphilis led me to undertake the following piece of work, and the paucity of independent research on this subject has encouraged me to put it on record.

Innumerable tests have been devised for the serological diagnosis of syphilis and descriptions of new ones continue to appear long before the true values of the previous ones have been assessed. It would not appear to be very difficult to decide whether a new test can be relied upon to show the presence or absence of a given disease, but in practice it is often impossible.

In dealing with syphilis, the difficulty lies largely in the nature of the disease itself, for it must be remembered that the majority of patients submitted to test may give no outward sign of disease whatever, except such peculiarities as are brought to view in the serum upon the addition of suitable reagents. Whether these changes necessarily signify the presence of living treponemata is generally unascertainable at the time of the test and cannot always be ascertained with certainty even after the lapse of years of clinical observation.

As we do not possess for the majority of cases any absolute means of determining whether syphilis is present or not, to submit the serum to several different tests is only of limited value in attempting to estimate the accuracy of a new method. To arrive at conclusions of permanent value, tests must be made over many years and constant correlation between laboratory and bedside findings maintained.

The main object of the following piece of work was to test the Vernes method of syphilimetry on a series of blood samples obtained in the rather rough and ready fashion of a general hospital. It will be shown later that the conditions under which samples are collected and stored can have a great influence upon results.

Vernes stresses the importance of using clear, fresh, non-hæmolyzed and non-chylous sera. No doubt, in the institutions under his control, where everything is subservient to "syphilimetry", these requirements can be fulfilled, but in a general hospital it is almost impossible to attain such a standard.

Up to the present, by far the most popular method of blood testing for the diagnosis of syphilis has

been the Wassermann test. This test depends upon the capacity of syphilitic serum to take up complement and prevent union and, therefore, hæmolysis from occurring in a "detector" system added later, consisting of washed red cells and anti-red cell serum heated in order to free it of its own complement. The chief objections to the test are: (i) complexity, (ii) great variations in the ingredients, and (iii) a considerable "personal" element in judging results.

The observations of Levaditi and others, in 1907, that the Wassermann reaction was not a true complement fixation, but could be brought about by non-specific substances, led a number of workers to the discovery that a precipitate could be produced in luetic serum by the addition of many widely differing materials, which were, under given conditions, without influence on normal serum. The basis of these "precipitation or flocculation" tests is the fact that the serum-globulin in syphilis is in a less stable state of colloidal suspension than is that of normal serum. Under suitable conditions of concentration, pH *et cetera*, precipitation of normal serum-globulin can be effected by the same substances which precipitate syphilitic serum.

The art of devising a new test lies in discovering such conditions as give the widest margin of differentiation between healthy and diseased serum. Klausner, in 1908, made use of distilled water; Sachs-Georgi used beef-heart extract and cholesterol; Dujarric de la Rivière, Sumatra gum-benzoin; Gaté-Papacostas, formalin; and, finally, Vernes, an ethylene chloride extract of horse heart. It would be easy to name at least fifteen other methods in vogue, mostly dependent upon the use of heart muscle extracts.

Though Arthur Vernes was not the first by any means to bring these facts to light, he was the first to investigate many of the physico-chemical as distinct from the clinical aspects of them. This scientific approach to the subject has no doubt greatly influenced his painstaking and methodical manner of handling clinical material. In order to express the amount of flocculation in precise figures instead of in multiples of *plus* signs as heretofore, he devised a very ingenious photometer and has been able to add many interesting facts to the science of opacity measurement or nephelometry.

He emphasized the important part which the precise colloidal state of the "antigen" can play in precipitation, and in order to have his horse heart extract ("Péréthymol") suspended in exactly the same state of division on every occasion, he made use of a special dropper and a mechanical mixer. These apparently unimportant accessories insure the production in all circumstances of a standard antigen which will produce, with the same serum, the same amount of flocculus.

The test itself consists in adding to two parts of the serum, which have previously been heated to 55° C. for thirty minutes, one part of the "Péréthymol" suspension.

A control tube is prepared by adding to two parts of serum one part of a mixture of alcohol and water (1 in 6.5). After four hours at 25° C. the optic density of the two fluids is read. The difference represents the "syphilmetric index".

The majority of non-syphilitic sera under these conditions will record less than 5°. In certain non-syphilitic persons an index of five or six may be found once in about 500 cases; once in 2,000, an index of from seven to eleven may be found.

These "hyperflocculant" sera can be differentiated from syphilitic sera by the fact that subsequent readings invariably give the same index in non-syphilitic, whilst in syphilitic sera peculiar rises and falls are noted.

The Wassermann and Vernes scales are compared at the top of Table I. Vernes has expressed himself generally as satisfied to regard readings above five as positive and below five as negative. Most of the cases in this series are reported on this basis, which does not allow for "doubtful" results.

These principles have been skilfully brought before the popular mind in France, and Vernes has been instrumental in organizing a great number of "*Instituts Prophylactiques*" in France and her colonies. In these institutions, where treatment is gratuitous, there is evidently the very closest connexion between laboratory and clinic, and records unequalled anywhere for precision and duration are preserved.

The present paper deals with the results of testing 1,000 sera by Vernes's method and independently by the Wassermann test. The latter was carried out by Miss H. Butler, who used technique number 4, as laid down in the *Medical Research Council's Special Report Series Number 14*. There was absolute agreement in 904 cases, that is to say, that in all these cases there was either a "negative" or a "positive" reaction with both tests. The total number of positive reactions in agreement was 116, that is, 11.6%.

In 96 cases the results differed absolutely, and they consisted of: (a) 38 in which the Vernes reading was positive and the Wassermann reading negative; (b) 41 in which the Vernes reading was negative and the Wassermann reading positive; (c) 17 cases in which a series of tests were carried out and the results were now positive, now negative. These latter are set out in full in Table I.

Of the 96 discrepant cases, the sera in 47 were noted as being very dark or chylous in appearance, while among the 904 cases in agreement the sera of only 52 were noted as being dark. It seems fair to assume, therefore, that had these dark or opaque sera been rejected and fresh samples called for, the discrepancies in the whole series might have been reduced by as much as 50%. This admittedly would have affected the value of the investigation, for, as was mentioned above, its object was to test the two methods under ordinary conditions.

In the same series 17 specimens were found by the Wassermann method to be anticomplementary;

TABLE I.  
The two scales appear to correspond approximately as follows:  
 Vernes : 3-7 8-10 11-20 21-40 } *et cetera.*  
 Wassermann : ± + ++ +++ }

Case Number.	Case History.		1st Test.	Interval in Days.	2nd Test.	Interval in Days.	3rd Test.	Interval in Days.	4th Test.	Interval in Days.	5th Test.	Interval in Days.	6th Test.	Interval in Days.	7th Test.
124	Gonorrhoea; request tests; no sign or history of syphilis.	Vernes : Wassermann :	12 — <sup>1</sup>	21	6 —	14	0 —								
355	Old and indecisive history only.	Vernes : Wassermann :	28 —	14	0 —	14	0 —								
210	Wassermann ++ in 1930; no treatment between tests shown here.	Vernes : Wassermann :	18 —	28	0 —	21	0 —								
5	Chancres three years ago; still under treatment.	Vernes : Wassermann :	13 +++	42	15 +	21	5 +++	14	5 +++	56	0 ±				
25	Syphilis under treatment.	Vernes : Wassermann :	0 —	20	0 +++	28	Not done. ++								
34	Syphilis under treatment.	Vernes : Wassermann :	0 —	7	0 ±	35	0 —	28	0 +						
135	Old syphilis. Insufficiently treated.	Vernes : Wassermann :	0 —	28	0 —	21	0 ±	35	38 +						
206	Tertiary syphilis four years ago; much treatment.	Vernes : Wassermann :	0 +	110	0 ±										
248	Syphilis ten years ago; much treatment.	Vernes : Wassermann :	0 ±	56	0 +										
274	Syphilis fifteen years ago; tabetic crises now.	Vernes : Wassermann :	0 +	14	0 —	49	0 ±	28	0 —	42	8 ±	28	0 +	35	0 ±
276	Syphilitic ulcer on leg, under treatment.	Vernes : Wassermann :	18 ++++	180	0 ±										
387	Syphilis two years ago; much treatment. One course of "Mithanol" between first and second tests shown here.	Vernes : Wassermann :	23 +	56	0 ++										
204	Chancro two years ago; five courses of "Novarsenobenzol" <i>et cetera.</i>	Vernes : Wassermann :	0 +	14	6 +	56	0 ++	14	0 +	21	20 +				
595	Syphilis under treatment.	Vernes : Wassermann :	10 ±	14	0 +++										
629	Syphilis under treatment.	Vernes : Wassermann :	43 ++++	49	0 +	14	0 ±								
657	Possibly Vincent's angina; nothing to suggest syphilis.	Vernes : Wassermann :	0 Anti-complementary.	7	0 ±	14	0 —								
724	Syphilis seven years ago.	Vernes : Wassermann :	0 +++	56	5 ++	35	0 ±								

<sup>1</sup> = indicates a negative reading.

TABLE II.

Case Number.	First Test.		Second Test.		Third Test.	
	Vernes.	Wassermann.	Vernes.	Wassermann.	Vernes.	Wassermann.
1	14	Anti-complementary.	38	++++	No examination.	No examination.
4	0	Anti-complementary.	43	+++±	No examination.	No examination.
5	52	Anti-complementary.	28	+++++	No examination.	No examination.
7	Too dark to read.	Anti-complementary.	35	Anti-complementary.	27	+++±
9	6	Anti-complementary.	40	++	No examination.	No examination.
16	35	Anti-complementary.	0	Trace of fixation.	No examination.	No examination.

six of the patients had their blood examined on more than one occasion and the results are set out in Table II. All the sera concerned were dark, some to the point of being almost unreadable in the photometer.

It would seem, therefore, that in dealing with a serum apparently unsuitable for the Wassermann or Vernes test, neither method is more reliable than the other.

Sixteen patients who presented themselves with chancres were examined for treponemata by dark ground illumination and also had their blood examined after varying intervals by the Wassermann and Vernes methods, with the following results:

TABLE III.

Patient's Initials.	Date of Positive Dark-ground Examination.	Vernes Reading.	Date of Blood Examination.	Wassermann Reading.
J.M.	May 28, 1931.	0	February 10, 1932.	—
M.B.	June 18, 1931.	4	April 6, 1932.	+
B.E.	September 12, 1931.	0	January 6, 1932.	+
L.T.	November 12, 1931.	0	January 27, 1932.	—
J.O'B.	November 28, 1931.	0	February 10, 1932.	—
W.D.	December 19, 1931.	Negative	on three occasions up to April 27, 1932.	—
C.M.	May 28, 1931.	0	February 10, 1932.	—
D.McC.	June 5, 1931.	0	December 16, 1931.	—
H.T.	June 25, 1931.	42	January 13, 1932.	++++±
H.G.	July 16, 1931.	36	January 13, 1932.	±
R.G.	August 5, 1931.	0	December 9, 1931.	±
L.F.	August 4, 1931.	49	November 4, 1931.	+++
J.B.	November 7, 1931.	0	January 20, 1932.	+++
B.W.	February 16, 1932.	0	February 18, 1932.	—
A.H.	January 12, 1931.	5	January 20, 1932.	+
F.McR.	January 27, 1932.	76	February 3, 1932.	++++±

The last three patients were untreated at the time of examination and there is no indication of gross difference between the two methods in point of detecting the earliest serological changes. Of the other 13 treated patients, whose blood happened to be submitted to examination by both methods (on an average of five months after the presence of treponemata had been observed), in only one (J.B.) was there absolute disagreement, the Vernes test giving a negative reading, the Wassermann, +++.

Surprisingly few studies have been published by independent workers comparing the Wassermann with the Vernes test. The most important of these was carried out at the Second Laboratory Conference (League of Nations) at Copenhagen in 1928.

Four hundred and forty-eight sera from syphilitic patients gave 171 positive readings by Vernes and 365 sera from non-syphilitic patients gave two false positive readings. The best Wassermann test demonstrated at this meeting (Harrison-Wyler, slightly modified from that in use at this institution) gave 190 positive results with the same syphilitic sera and no false positive results with the same non-syphilitic sera.

It is interesting to note that the Kahn (precipitation) test, carried out by Kahn himself, gave 264 positive results with the same 448 syphilitic sera and no false positive results with the same 365 non-syphilitic sera.

There was, therefore, a discrepancy of 6% between the results obtained by the Vernes and the Wassermann methods, as compared with 9.6% in the present series.

A similar comparative series was published by H. Wansey Bailey in 1929.<sup>(1)</sup> In 863 cases there was complete agreement in 74%. The remaining 26% was composed as follows:

Wassermann negative, Vernes doubtful and positive	11%
Wassermann positive, Vernes negative	12%
Wassermann doubtful, Vernes negative	2%
Wassermann doubtful, Vernes positive	1%

On consideration of the case histories he concludes that the Vernes test registers the reaction of the patient to treatment more delicately than does the Wassermann.

Peli,<sup>(2)</sup> in 1927, compared the reactions of 2,056 sera to the Wassermann, Meinicke-Truebung and Vernes tests and concluded that the Vernes test was more "sensitive", especially in tracing the effects of treatment. He thought it just as specific as the Wassermann test and believed that it would give a positive reaction at an earlier date than would either the Meinicke test or the Wassermann test.

Chaverdov<sup>(3)</sup> compared 3,000 cases submitted to the Vernes test and to a Wassermann test, the method not being stated. He finds 82.7% of cases in concordance and concludes from a general analysis of the facts that the Vernes test is the more "sensitive" of the two.

Rapaport<sup>(4)</sup> examined 2,000 patients and made 34,748 serum examinations by the Vernes, Sachs, Meinicke, Dreyer and Kahn methods, and concluded that the Vernes method was the most efficient; although the Meinicke method gave earlier and



stronger reactions, it had the grave disadvantage of giving false positive reactions.

#### Conclusions.

The Vernes method has the great advantages of simplicity and capacity for standardization.

In general hospital practice it requires the use of fresher and clearer sera than can be easily obtained.

Much further trial will be necessary before the value of the test can be finally appraised.

#### Acknowledgement.

I have to acknowledge with gratitude much help and courtesy received from Miss H. Butler, of the Baker Institute, Melbourne.

#### References.

- <sup>1</sup> H. W. Bailey: "Vernes' Method", *The Lancet*, March 2, 1929, page 435.
- <sup>2</sup> G. Fell: "La Reazione di Vernes", *Il Policlinico*, Volume II, 1927, page 565.
- <sup>3</sup> A. S. Chavardov: "Contribution à la valeur comparée de la réaction de Vernes et du Wassermann", *Vratchénoie Délo*, Number 18, September 30, 1929, page 1157.
- <sup>4</sup> N. Rapaport: "Étude comparative des réactions de Vernes, Sachs, Meinicke, Dreyer et Kahn", 1929.

### Reports of Cases.

#### BRONCHOPNEUMONIA TREATED BY OXYGEN-CARBON DIOXIDE INHALATION.

By F. A. MORRISON, M.B., Ch.M. (Sydney),  
Boolaroo.

THE following notes would seem to justify the statement that facilities for administering oxygen-carbon dioxide inhalation should be provided at all hospitals.

The patient, W.B., a male, aged seventy-three years, was first seen on May 23, 1932, and complained of a persistent cough of four days' duration. His temperature was 37.8° C. (100° F.), the pulse rate 96 per minute and of poor volume, and there were râles widely distributed over both lungs anteriorly and posteriorly. The systolic blood pressure was found to be equivalent to 110 millimetres of mercury and the diastolic to 65. A diagnosis of acute bronchitis was made, an expectorant mixture being given and the patient being instructed to change his position frequently in bed.

Two days later his condition was much worse. The breathing had increased in frequency, the face was flushed, the cough was almost continuous with but little sputum, and the patient had been delirious the previous night. There were still numerous râles over both lungs and also numerous fine crepitations over the lower half of the right lung posteriorly. There was no dullness and no tubular breathing. The blood pressure was unaltered. A diagnosis of acute bronchopneumonia was accordingly made, and in view of the patient's age and of the lowness of the blood pressure a guarded prognosis was given. Two days later I received an urgent message to come to the patient, as he was thought to be dying. He had apparently recovered somewhat by the time I arrived, but he nevertheless looked extremely ill. His cheeks were ashen, and the lips slightly cyanosed. He was semicomatose. The breathing was very rapid and shallow, and the pulse rapid, irregular in time and volume, and thready. The highest systolic blood pressure recorded was 100 millimetres of mercury and the diastolic sixty. The general condition of the patient was so low that the outlook appeared quite hopeless. An injection of one cubic centimetre of "Coramine" was given intramuscularly, and it was then decided to try the effect of oxygen-carbon dioxide inhalation. The apparatus necessary was supplied by the courtesy of the Superintendent of the Newcastle

Mines Rescue Station, and was operated by members of his staff. By means of a close fitting face mask the patient was given five minutes' inhalation of a mixture of 95% of oxygen and 5% of carbon dioxide at the rate of thirty litres per minute. The patient's colour improved almost immediately, and the respirations became much deeper and slightly slower. After about two minutes his drowsiness disappeared and he became wide awake. At the end of the administration his general condition showed an unmistakable improvement, and it was decided to persevere with the treatment. Three more inhalations, each of five minutes' duration, at hourly intervals, were given, and by that time the patient's condition had improved so much that the treatment was suspended for the night, and a hypodermic injection of 0.016 gramme (one-quarter of a grain) of morphine hydrochloride and 0.65 milligramme (one one-hundredth of a grain) of atropine sulphate was given.

The next day it was found that the patient had passed a good night; he was wide awake, but still delirious at times, the pulse was still irregular, but improved in quality, the temperature was 39.5° C. (103° F.), the distribution of the râles was much the same, but the area over which the crepitations could be heard had decreased in size. Eight more inhalations were given that day, and this treatment was supplemented by one injection each of "Coramine" (one cubic centimetre) and "Pituitrin" (one cubic centimetre), with the usual injections of morphine hydrochloride and atropine at night. On the following day there was a marked improvement. The temperature had fallen to 37.2° C. (99° F.), there was no delirium, the pulse was regular, and the blood pressure had risen to its original height. The râles were still present, but there were very few crepitations. Six inhalations were given on that day, but no hypodermic injections. The next day the temperature was 36.6° C. (98° F.), the patient felt well, the cough had lessened considerably in frequency, and although there were still numerous râles to be heard, the crepitations had disappeared. No further inhalations were given. A week later the patient was well enough to leave his bed.

The result of oxygen-carbon dioxide inhalation in this patient was dramatic, and I have no doubt that it will prove a most useful method of treatment in cases of this kind.

#### ACUTE MASTOIDITIS.

By ARTHUR MURPHY, M.B., Ch.M. (Sydney),  
Brisbane.

Miss J., aged twenty-three years, consulted me on November 26, 1929, having complained of violent pain in the left ear for about twelve hours. The drum membrane was red and bulging, the temperature 37.5° C. (99.6° F.), the pulse 104. I incised the drum and inserted a gauze wick. Twenty-four hours later the temperature was 39.1° C. (102.4° F.) and there was exceptionally profuse seropurulent discharge through the drum incision. The pain had been less violent. The patient entered hospital and for the next forty-eight hours approximately showed signs of improvement; then the temperature rose abruptly from 37.5° C. (99.6° F.) to 38.9° C. (102° F.) and pain reappeared as a distressing feature. Since the first day the pulse rate had varied between 90 and 108 without definite relation to the temperature; the discharge had remained profuse, but she had constantly looked ill. Following a simple mastoid operation done on this the fourth day of illness, within twenty-four hours her temperature receded below 37.8° C. (100° F.) and her pulse to 88; but the day following, to the accompaniment of violent pain, this time not in the ear, but in the left temporal region, the temperature rose abruptly to 40.5° C. (105° F.) and higher, and the pulse rate to 132. She had looked moderately ill all along; now she began to look critically afflicted. It was evident that intracranial spread of the infection had commenced and was very virulent.

Ruttin, of Vienna, has issued a warning against hasty decisions in these complications; actually he counsels that

one sleep on the problem, and having decided on this course I ordered thirty cubic centimetres of antistreptococcal serum mixed (Commonwealth Laboratories), to be administered subcutaneously every four hours. After three injections violent vomiting caused me to suspend them, but during this day a feeling of well-being on the part of the patient persuaded me to persist, so a further series of three injections was given. In a little over forty-eight hours from the first injection the temperature receded to normal and below, the pulse descended into the region of the eighties and they remained there.

The temporal pain remained with gradually abating intensity, to disappear finally some months after she had otherwise regained her health.

## Reviews.

### MENTAL DEFICIENCY.

It is interesting to find the problem of mental deficiency being dealt with by two medical men, Dr. F. C. Shrubbsall and Dr. H. C. Williams, who have, as well as medical knowledge, experience and service with the London County Council to offer to readers.<sup>1</sup> The authors make no pretence at setting up a text book on the subject. The opening chapter includes a brief historical review of mental deficiency, and the authors evaluate the intellectual, social and behaviouristic aspects implied in the term "mental defective" and the true significance to be drawn from a consideration of mental tests as applied to aments. Native and acquired intelligence might have been exploited and contrasted in this opening chapter. The chapter on pathology is rather patchy. In dealing with tuberous sclerosis the authors do not mention the occurrence of localized tumour masses, sometimes of rhabdomyomatous type. They make passing reference, when dealing with aetiological factors, to their experience regarding the age of the parents of defectives of mongol type and to the order of the birth of mongols, an experience which is common to other workers in this field. An interesting table is given relating to the position of mongols in the family. Commendable restraint is also shown by the authors in discussing the latter part of the reference to Crookshank, "that the complete syndrome, i.e., mongolism, is only found in those examples in which both parents have shown signs of partial mongolism", a view that is contrary to actual experience. The importance of the relation of physical or functional disabilities to mental incapacity in the clinical examination of patients is not lost sight of, and the relative value to be placed on evidence presented of stigmata of degeneration are not forgotten. Useful practical hints are given for the correct approach and gaining of rapport of patients submitted for clinical examination, both mental and physical. A rational interpretation of the results of mental tests, which are detailed, and their significance in their relation to the mental status of the individual, are delineated, also the fallacies to be guarded against. The standards set down for the behaviour of infants during the developmental stages are perhaps open to criticism; and the authors might have indicated that such standards of individual capacity are more or less relative and dependent upon certain influences, extrinsic or intrinsic, and upon compensatory factors of which cognizance may require to be taken. The problem of the prevention of the marriage of defectives on licence is dismissed in a line or two. Attention is drawn to the fact that the most striking successes in treatment have been obtained with high grade unstable and delinquent children as a result of character training and vocational education so that they may be ultimately able to support and maintain themselves in regular and satisfactory occupation. It is also refreshing for readers

to be reminded, usually contrary to popular opinion, that the offspring of such individuals, by regular or irregular unions, is astonishingly small, and only a very small minority of them are defective.

Little attention has been paid to the relation of psychoneurotic concomitants or constitutional factors or to the psychology of many behaviour anomalies seen in the mentally deficient child.

The second half of the book deals with methods of disposal, legal aspects and general applications of the English law and duties under various authorities, together with a very complete list and examples of forms in use by various institutions controlled by such authorities. It will perhaps leave the casual student and reader with the conviction that the term "mental deficiency" bids fair to outrival the term "insanity" as a purely legal concept, with its stiff attributes of formality, rather than as a medical and sociological problem necessitating a sympathetic approach. The medical readers in the government services, however, will be able to indulge in an orgy of legal formulations and routine specimen forms sufficient to satiate the appetite of the most indulgent.

An alphabetical index is included and the typography is all that could be desired.

### NURSES AND PATHOLOGY.

In his book, "Pathology for Nurses", Eugene C. Piette has treated the subject in an admirable manner.<sup>1</sup> The difficulties when writing for nurses are many, and the general tendency is to make the subject treated too difficult for the limited time at the disposal of most nurses.

This book consists of 250 pages, divided into fifteen chapters. The printing is excellent; leading words and phrases appear in heavy type, and the illustrations are clear and good. At the end of each chapter is a summary and a list of questions. The first eight chapters are devoted to the general aetiology of diseases, retrogressive and progressive changes, circulatory disturbances, inflammation, tuberculosis, syphilis and benign and malignant tumours.

In the ninth chapter the author stresses the value of *post mortem* examination and the influence that a nurse may have in obtaining consent to a *post mortem* examination when relatives offer opposition.

The remaining chapters include those on urine, blood, blood chemistry, the examination and collection of gastric juice, faeces, sputum, spinal fluid, smears, and the preparation of patients for various tests.

The book is well indexed and is singularly free from misprints. On the whole this book should prove of great value to nurses sitting for their final examinations and for post-graduate reading.

### DISCHARGE FROM THE EAR.

"THE DISCHARGING EAR", by Arthur G. Wells, represents a further addition to the well known "Pocket Monographs on Practical Medicine", and is one of the most commendable of the series.<sup>2</sup> Here is a booklet easy to hold and easy to read, containing just enough, yet missing none of the essentials of this all important branch of human ailment. The subject is simply and systematically explained, the recommendations are not confused by variety, nor are they controversial, with the result that the busy practitioner or student can go to this book with a feeling that herein he will find just what to do, when to do it, and why, until occasion arises on which a specialist must be called on. Publishers and author alike are to be congratulated in adding to the host of medical texts so pleasing and useful a volume.

<sup>1</sup> "Pathology for Nurses", by E. C. Piette, M.D.: 1932. Philadelphia: F. A. Davis Company. Demy 8vo., pp. 251, with illustrations. Price: \$1.75 net.

<sup>2</sup> "Pocket Monographs on Practical Medicine: The Discharging Ear", by A. G. Wells, B.S., M.B., D.P.H.: 1932. London: John Bale, Sons and Danielsson, Limited. Foolscap 8vo., pp. 89. Price: 5s. net.

<sup>1</sup> "Mental Deficiency Practice: The Procedure for the Ascertainment and Disposal of the Mentally Defective", by F. C. Shrubbsall, M.A., M.D., F.R.C.P., D.P.H., and A. C. Williams, M.R.C.S., L.R.C.P., D.P.H.: 1932. London: University of London Press, Limited. Demy 8vo., pp. 358. Price: 12s. 6d. net.

# The Medical Journal of Australia

SATURDAY, SEPTEMBER 3, 1932.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

## IMMUNIZATION AGAINST DIPHTHERIA.

IN the issue of July 9, 1932, there appeared in this journal a review of an important book on diphtheria by Dr. J. Graham Forbes. In this review reference is made to active immunization in the individual and to the evidence adduced by Dr. Forbes as to its value. The conclusion is that immunization is by far the best means of protecting any child from a serious attack of the disease. Although it is pointed out that there is not yet sufficient evidence to enable us to assert that diphtheria can be permanently controlled in a large community, it is stated that the latest reports from New York and Canada indicate that if a sufficiently large percentage of the child population be immunized, there is every hope of a tremendous fall both in mortality and in incidence. These are, of course, well known facts, and, as they have been recently stated in the review of a book, further reference to them in the editorial pages of the journal may seem a waste of space. Would that it were. There are large country towns in Australia in which the diphtheria problem is treated lightly—children obviously the subject of the disease are given antitoxin, but no attempt is made to discover contacts by throat swabbing, while the carrying out of a Schick test apparently is never considered. Hence to expect active immunization to be

attempted in these towns would be the height of absurdity.

In June, 1931, at a conference of experts held in London, reports were received of studies in immunization against diphtheria carried out in nine European countries. The resolutions of the conference have received the approval of the Health Committee of the League of Nations and have been published in *The Lancet* of May 28, 1932. The resolutions are fourteen in number and should be brought to the notice of medical practitioners. Some of them deal with general principles and others with details of the method of injection, the number of injections necessary, and so on. Details of method need not be mentioned in the present discussion. The first resolution affirms the value of immunization in reducing the mortality and morbidity rates among children. It is then stated that the reactions sometimes observed after injection of diphtheria prophylactics give no cause for alarm and should not interfere with the campaign for the immunization of children, that the reactions should not prevent the choice of the most active prophylactics, and that, in spite of a few exceptional cases, the efficacy of immunization may be deduced from the change of the Schick reaction from positive to "negative". Formol toxoid (anatoxin) was found to be the most efficient of the antigens investigated. This has been the experience of Australian workers. It is held to be unnecessary to carry out the Schick test before immunization; and the recommendation is made that immunization should be carried out not later than during the pre-school period, after the end of the first year of life. If the children have not been immunized during the pre-school period, they should be immunized, if possible, during the first year of school attendance. Immunization is to be recommended even during epidemics for children who have been in contact with patients, as there is no evidence of a negative phase. The last resolution is as follows:

In the opinion of experts, diphtheria immunization should form the subject of active public education on the part of health administrations of the different countries in order to bring home to every one the advantages of this method of protection in safeguarding the public health.



In view of their origin and of the seal set on these statements by the Health Committee of the League of Nations, their reliability is beyond question. This needs to be emphasized from the point of view of the general public, especially if any attempt is made to give effect to the last resolution. Some of the members of the community will doubtless remember the tragic happenings at Bundaberg in 1928, and on that account will find it difficult to accept the teaching of health authorities. Be that as it may, efforts to teach the public will be of little avail until the health authorities prevail on delinquent medical practitioners to do their duty. At the present time it appears that in most instances, apart from compulsory notification, the steps taken by medical practitioners in regard to the eradication or prevention of infectious disease depend entirely on their inclinations. Fortunately, the inclinations of practitioners in certain districts are in the right direction. For the others the health authorities should use compulsion. If necessary, new legislation conferring powers of compulsion should be introduced.

### Current Comment.

#### THE CENTRAL NERVOUS SYSTEM AND PEPTIC ULCER.

NOTWITHSTANDING the mass of invaluable knowledge that has accumulated through the labours of the surgical and histological anatomists and of the experimental pathologists, there is need of a clearer light on the ætiology of ulceration of the stomach and duodenum. The tide of battle has ebbed and flowed over the treatment of peptic ulcer, and great advances have been made, though finality will probably never be reached. But even sterner struggles have been waged over the controversial question of causation. Infective, vascular and nervous mechanisms have all been invoked, and all with good reason. Possibly not one alone tells the whole story. As regards the nervous factor, a certain amount is known, ranging from the clinical recognition of the highly strung type of "ulcer patient" to the experimental production of gastric erosions by causing lesions in the central nervous system. A highly interesting contribution to this aspect of the subject has been published by Harvey Cushing.<sup>1</sup> In common with all the work of this great neurosurgeon, this contribution is clear, stimulating and, above all, based on carefully observed and recorded clinical and experimental studies.

Cushing narrates a number of instructive cases in which death followed operations on the brain, not due to any direct intracranial complication, but to perforative erosion of the upper part of the digestive tube. This condition, demonstrated at autopsy, was not a *post mortem* change, for there were indubitable *ante mortem* evidences of an abdominal catastrophe; nor was it due to a previously existing pathological state, as was proved by the careful histological studies. In one such patient, of the tender age of ten years, extensive digestion of the lower part of the œsophagus occurred involving also the mediastinal tissues. In other cases in which death was directly attributable to the actual surgical procedure, small erosions were found in the gastric mucosa. With this is linked up the observation of the vomiting of sanious fluid by patients who made a good recovery after intracranial operations. Cushing tells how the first of these fatalities, which happened a number of years ago, led him to invoke causes such as the use of the prone position for many hours on the operating table (the operations were chiefly on the cerebellum), mechanical or toxic damage from ether vapour under pressure, or possible irritation from the presence of a diathermy electrode on the abdomen. But none of the suggestions was at all satisfactory.

Working later on the hypothesis that there might be some direct cerebral irritation of the visceral centres, he then assembled further evidence. A patient, aged thirty-two years, suffering from malignant hypertension with raised intracranial pressure sufficient to cause choking of the optic disks, died in coma with hyperthermia. *Post mortem*, multiple gastric ulcers were found. The same findings were noted in another relatively young person with the same type of cerebral vascular disease. Another patient was operated on for what was thought to be a cerebral tumour, but was really a basilar aneurysm; autopsy revealed extensive gastric autodigestion.

It will be seen from this brief summary that there appears to be good reason for believing that a definite disturbance of brain centres was responsible for the formation of actual ulcers in the upper digestive tract. As Cushing points out, the importance of recognizing the possibilities of imbalance between the sympathetic and parasympathetic systems has been known well for some time, though all will not follow Hess and Eppinger to the extreme of their rather artificial classification. Also, the neurologist and the anatomist have lately realized that important sympathetic and vagotonic centres are present at least as high in the brain as the diencephalon, and these centres are in close relation with the locus of the primitive emotions. Even the practitioner who is little interested in these considerations will agree with Cushing when he draws attention to the frequency of peptic ulcer in "nervous" people, and to the healing of an ulcer, or at least its quiescence, with rest; but its symptoms will promptly recur when the patient is exposed to the noxæ of too much work and worry.

<sup>1</sup> *Surgery, Gynecology and Obstetrics*, July, 1932.



Add to this some experimental findings. Gastric and duodenal ulceration can be produced in animals in several ways, of which the work of Rosenow on focal sepsis is a good example. But perhaps too much has been made of the local factors. As a nidus for the process of infection ischaemic or infarcted areas have been suggested; but how are these produced? Cushing and his coworkers have brought forth evidence that erosions of the stomach can be produced by pilocarpine and pituitrin, but much more readily when the drugs are introduced into the ventricles of the brain than by the subcutaneous route. Beattie has caused increased peristalsis and secretion and even erosions near the lesser curvature by stimulation of the tuberal region. It is interesting that pituitrin has a similar action to adrenaline when given subcutaneously, causing a blanching of the gastric mucosa and arrest of movement, whereas its introduction into the ventricular system activates movement of the stomach and brings forth a secretion containing increased amount of acid and even blood.

It would seem logical to admit the probability of the following sequence of events: stimulation by psychic or other influences of the nuclei in the tuberal region, release of the vagus from sympathetic antagonism, spasm of the stomach muscle, ischaemia of the small terminal vessels, infarction, and finally, digestion by the hyperacid gastric juice. This hypothesis does not in any way brush aside such important factors as sepsis. But it does give some explanation of the mechanism by which the ulceration begins and how the local vascular disturbance may arise. Moreover, it indicates why the peptic ulcer should so often be inveterate. Some clear idea of this concept must surely be of interest to all, from the neuro-anatomist whose chosen playground is those nuclei and fibre tracts by so many regarded, though wrongly, as of little practical importance, to the practitioner who insists on the need of rest and freedom from care for the patient whose peptic ulcer proves resistant to treatment.

#### THE TREATMENT OF ANTHRAX.

ANTHRAX, most commonly met with in this country in the form of the so-called "malignant pustule", demands a rapid diagnosis, not always an easy matter for those who seldom see it, and the question of treatment can hardly be said to be settled in all particulars. In regard to treatment, there are advocates of complete excision and there are those who oppose so radical a method with equal vigour. Millard, of the Coast Hospital, New South Wales, has reported many cases in which successful treatment was carried out by excision. At the Coast Hospital excision is sometimes practised and serum is also used. The place of serum in treatment is a very important point to settle, for the mortality, extremely high in the internal varieties, is disturbing enough even in the external forms. The case recently reported in this journal

by Hamilton, of Adelaide, will stimulate interest in serum therapy, and his excellent result has been paralleled by P. F. Lucchesi in a review of nineteen cases in which anthrax antiserum was used.<sup>1</sup>

Lucchesi, writing from the Philadelphia Hospital for Contagious Diseases, is able to draw upon the rather large number of cases occurring in the State of Pennsylvania, where the tanning industry is responsible for a high incidence of anthrax. Of 123 patients suffering from anthrax during a period of twelve years, 20% died, but in the later series of 19 cases occurring in the last three years and a half, there were no deaths. All the infections in this series were proved to be instances of anthrax infection by bacteriological methods. The author points out that there is no evidence that anthrax is contagious from one person to another, or rather that the cases reported where infection was transmitted from person to person are extremely few. Therefore, there seems to be little reason why general hospitals should not undertake the treatment of this disease. All but one of this series were examples of external infection, but one was an exceptionally severe infection, the specific organism being recovered from the sputum and the blood as well as from a skin lesion. That this patient recovered is a therapeutic triumph, for though, as Hamilton observes, recoveries even in spite of a septicæmic state are recorded, they must be rare.

The average dose of serum given was approximately 500 cubic centimetres, the smallest 200, and the largest over 1,000. No serious troubles were encountered with serum sickness. In no case was the local lesion interfered with surgically, but whenever the anatomical site permitted, serum was injected locally in amounts ranging from 30 to 50 cubic centimetres. Serum was given by the intravenous route, and after withdrawal of blood for a blood culture, serum to an average amount of 150 cubic centimetres was injected slowly after being warmed. The smallest initial dose employed was 100, and the largest 250 cubic centimetres. This dose was repeated according to the indications in twenty-four hours.

Of course, it must be admitted that even a series of cases showing the most excellent results does not prove that the special treatment adopted is altogether responsible. As Hamilton points out, the experimental evidence in support of anthrax antiserum is very contradictory, and Lucchesi quotes the remarkable series of Pijper (forty recoveries without a death following the use of "Neoarsphenamine"), and the even more interesting record of Krouse, who had a mortality of only 0.5% among 200 patients treated with normal beef serum.

We cannot assume that a disease known to be fraught with most dangerous possibilities would have taken on a suddenly mild character in all these quoted cases. Hence it seems reasonable to assume that there are several possible ways in which recovery may be assisted, and of these serum is on the evidence worthy of more extended trial.

<sup>1</sup> *The American Journal of the Medical Sciences*, June, 1932.

## Abstracts from Current Medical Literature.

### MEDICINE.

#### The Treatment of Diabetes.

H. RAU (*Deutsche Medizinische Wochenschrift*, January 29, 1932) discusses the treatment of diabetes mellitus in children. As the growing child requires a caloric intake per kilogram of body weight two or three times that of the adult, treatment in the pre-insulin period was very difficult. Diets of low caloric value could not be sustained over long periods because of the permanent damage to vital organs. Nor would children take such diets voluntarily. Since the introduction of insulin it has been possible to combine insulin injections with a diet rich in carbohydrates. Such a diet must be measured daily, both qualitatively and quantitatively. The author believes in small doses of insulin—10 to 30 units daily—given in one large dose in the morning and a smaller one at night. The meals are divided into five with a caloric value averaging 2,000 (proteins 2%, fats 48%, carbohydrates 40%). Full details of such diets are appended. He emphasizes that an increased carbohydrate diet does not require any increase in insulin dosage as compared with that necessary with a low diet, and that the hepatic glycogen reserves are not affected.

#### Hyperthyroidism.

M. E. HOLMES (*Annals of Internal Medicine*, February, 1932) draws attention to the necessity of distinguishing between the neuropathic patient with possibly elevated metabolism and the patient whose symptoms are due to the condition of his thyroid. Hyperthyroidism for the most part is a well defined, yet often not easily diagnosed, symptom complex. The most dependable symptoms are definite loss of weight in the presence of normal or increased food intake, persistent tachycardia of over 80, and a constant feeling of warmth or a sensitiveness to heat. On the other hand, symptoms often associated with Graves's disease, such as fatigue, sweating, tremor, transient rapid heart rate, choking sensations, loss of weight in the presence of anorexia and subnormal food intake, nervousness and emotionalism are more often caused by functional disorders of the nervous system than by true thyroid disease. Nervous symptoms may not be related to a coexisting goitre. When there is definite nervous or mental family tendency, a marked chronicity of nervous symptoms is a factor against the diagnosis of hyperthyroidism. Great caution should be exercised in making a diagnosis of hyperthyroidism in a patient under twenty years of age. The value of the basal metabolic test is often vitiated because of errors of technique or interpretation. The test can be

accurately performed only after a course of training. Care should be exercised in diagnosing mild hyperthyroidism with metabolic rates of +15 to +35, especially if of short duration. Such patients should be subjected to repeated metabolic studies.

F. H. LAHEY (*Annals of Internal Medicine*, March, 1932) discusses the management of severe and atypical hyperthyroidism. Thyroid crises occur in hyperthyroidism induced by slight ailments in some cases. These crises are the danger signals of the disorder; they frequently succeed operation. Vomiting and emotional upset often precede the crises. If iodine has not previously been given, when signs of a crisis appear, Lugol's solution should be given in doses of ten drops three or four times a day, by mouth or by rectum. If these routes cannot be used, 3-0 mls (fifty minims) of Lugol's solution in 750 cubic centimetres of salt solution should be administered by hypodermoclysis. Morphine or "Sodium Amytal" helps to diminish symptoms. Three thousand cubic centimetres of salt solution with 150 grammes of glucose should be given every twenty-four hours until the pulse rate falls, excitement decreases, the mental state becomes clear, and vomiting and diarrhoea cease.

#### The Intestinal Tract, Diet and the Treatment of Arthritis.

R. PEMBERTON AND E. G. PEIRCE (*Annals of Internal Medicine*, April, 1932) report nine cases to demonstrate the influence of a restricted diet on properly selected cases of arthritis. They claim that anatomical, physiological and topographical abnormalities of the intestinal tract can be demonstrated by radiological studies in patients suffering from arthritis and that under appropriate conditions of diet, these abnormalities, chiefly of the large intestine, disappear. They conclude that the abnormal contour of the bowel encountered in arthritis is one consequence of arthritis in general, whatever its aetiology, and that the presumably abnormal function of the bowel becomes an additional contributory or causative factor in perpetuating the disease. Removal of an original infective source may fail to influence secondary general consequences. The aetiology of arthritis involves a cycle in which various factors are coordinated and no one factor can be stressed aetiological or therapeutically to the exclusion of the rest. It is no longer sufficient to state that a certain organism was found in the tooth or prostate and to administer the respective vaccine. It would appear that sharp curtailment of diet, approaching starvation, may bring about restoration of movement within the remaining range of true joint movement, to a degree which has not been regarded as possible. The authors particularly stress, however, that measures approaching starvation must

not be applied to arthritics in any wholesale way. The propriety of instituting dietetic treatment in arthritis must always be determined independently. References to literature are given by the authors.

#### Pernicious Anæmia.

M. B. STRAUSS AND W. B. CASTLE (*The Journal of the American Medical Association*, May 7, 1932) describe the results of treatment of pernicious anæmia by intramuscular injections of liver extract. A neutralized watery solution of liver extract was used. Twenty-seven patients were observed for some months. The extract obtained from 100 grammes of liver was dissolved in twenty cubic centimetres of water, neutralized and filtered, and preserved by addition of tricesol. Intradermal injection of 0.1 cubic centimetre of this extract may produce local erythema within twenty-four hours; if not, it may be assumed that intramuscular injection will not cause erythema. If erythema does occur, the same site should be chosen for each subsequent injection; no reaction should then occur after the fourth dose. Injections of amounts of extract derived from fifteen to one hundred grammes of liver once every one or two weeks were found sufficient to maintain health. Patients resistant to oral administration of liver extract, even in daily doses of extract equivalent to 600 grammes of liver, responded rapidly to intramuscular injection of extract equivalent to 100 grammes of liver. Symptoms of spinal cord degeneration which resisted oral liver therapy, responded in several instances to intramuscular injections. Patients suffering from sprue also improved considerably with this treatment; whereas it was found useless in cases of hemolytic jaundice, Banti's disease, leucæmia, aplastic anæmia, and azotæmic nephritis.

#### Presence of a Distinct Insulin After Pancreatectomy.

G. H. TUTTLE (*The New England Journal of Medicine*, January 7, 1932) has analysed Soskin's tables published in *The Journal of Nutrition* for September, 1930. Acknowledging the accuracy of these tables, he does not find it necessary to agree with the explanation of the author or with his deductions in favour of the "overproduction theory of diabetes". Instead, he uses the tables to show the existence of an extrapancreatic or cellular insulin in the dog after pancreatectomy. This would appear to be demonstrated if the oxidation of a considerable quantity of glucose can be shown in the absence of the pancreas, because it is generally acknowledged that glucose cannot be oxidized in the absence of insulin. This cellular insulin exists only in small quantities at first, but its amount increases as the experiments go on, as indicated by respiratory quotients of 0.90 or more. It is doubtful if cellular insulin can be extracted from normal animals since

the amount existing in any one part of the body must be small, yet data from Soskin's tables show that it may be stimulated by high blood sugar. The object of the analysis is solely to prove the existence of this insulin as an insulin distinct from pancreatic insulin. It is recommended that the tables be studied in conjunction with the analysis given.

#### Comparison of Methods of Gastric Analysis.

E. H. GAITHER (*Annals of Internal Medicine*, February, 1932) compares the various diagnostic methods of estimating the secretory function in gastric disease. One hundred dispensary patients were selected, in whom every available method had been used to insure correct diagnosis. For each patient three tests were used: the histamine test, the Ewald test meal and the alcohol test; the fractional method was used. The author finds that Ewald and alcohol meals are effective stimulators of gastric secretion. The objection that the gastric juice is contaminated and diluted by the meal itself, by the saliva and by the regurgitation of duodenal contents and that the results are thereby masked, is not sustained. The labile character of the gastric secretion is proved. Histamine does, in a number of cases, establish the fact that the glands possess the power of acid secretion, when, after the Ewald or alcohol test, an achylia would seem to be present. The alcohol meal is not nearly so potent a stimulant of gastric gland secretion as the Ewald meal. There is ample justification for the continuance of the Ewald meal as a dependable test. The claim that histamine is vastly superior as a stimulant of acid secretion has been disproved. It would appear that the application of bread and water as a test of gastric gland secretion is more physiological than the subcutaneous application of the foreign body, histamine.

#### Spontaneous Pneumothorax.

L. S. T. BURRELL (*Tubercle*, July, 1932) discusses the ætiology and treatment of spontaneous pneumothorax. He regards this condition as being more common than is generally believed. In chronic pulmonary tuberculosis small and temporary spontaneous pneumothorax is common, and it probably occurs in many apparently healthy persons, but is not diagnosed. He classifies the causes of this condition under three main headings. The first is the group of gross non-tuberculous diseases, such as carcinoma, abscess and gangrene of the lung. In these treatment is mainly symptomatic and prognosis grave. With a ruptured pulmonary abscess treatment consisting of aspiration, gentle lavage, and later, surgical drainage, may result in the patient's recovery. The second ætiological heading he gives as rupture of an emphysematous bulla, this being the cause of spontaneous pneumothorax occur-

ring in the apparently healthy person. The author points out that this is uncommon in general emphysema associated with chronic bronchitis. Prognosis in this type is good and treatment consists in rest until the lung has reexpanded. The last group is that associated with active pulmonary tuberculosis, in which three subclasses are recognized. First, there is spontaneous pneumothorax with a rapidly healing perforation, wherein clear fluid may form, but never pus. It is good practice to convert this type into an artificial pneumothorax. Secondly, the perforation may heal, but tuberculous pus may form. Here, with a grave prognosis, treatment is directed towards obtaining reexpansion of the lung. This is done by repeated aspirations of the pleural cavity followed by washing out with Dakin's solution. If pus continues to form, the creation of an oleothorax or a gelatinothorax is suggested. If the lung shows no sign of reexpanding after six months' treatment, thoracoplasty is recommended, unless, of course, the contralateral lung is seriously affected. In these circumstances treatment can be but palliative. In the last class the perforation does not heal, and a pyopneumothorax persists. Here lavage is fraught with danger to the delicate bronchial mucosa, but aspiration can be tried, in the hope of improving the patient's general condition. If this results, a thoracoplasty may be carried out. The author insists that drainage in tuberculous empyema or tuberculous pneumothorax is only justified as a last resort to relieve symptoms, when the cavity cannot be closed by the ideal method of reexpansion of the lung, or failing this, by thoracoplasty.

#### Arteriosclerosis.

J. PLESCH (*The Lancet*, February 20, 1932) publishes some notes on arterial atony and arteriosclerosis, which he regards as a constitutional disease, affecting mainly unstriated muscle, sympathetic nerves and connective substance. The essential lesion in arteriosclerosis is the weakening of both muscular and elastic laminae. The nodular form of arteriosclerosis occurs in curved arteries with numerous branches, for example, the coronary, carotid, cerebral, subclavian arteries, and arteries of the intestine. The diffuse form of arteriosclerosis occurs in straight arteries with few branches. Tonicity of diseased arteries is diminished. Any influence which weakens the organism and produces a general atony, can also cause arterial atony or lack of tone. Acute or chronic infections, alimentary insults, intoxications of any kind, nervous influences, diabetes, gout or obesity induce atonic states, as a result of which a purely mechanical and secondary arteriosclerosis develops. Athletes show marked arterial calcification by the age of thirty-five or forty. Severe bodily exertion is followed by a severe relaxation of the blood vessels. Moenckeberg showed that

40% to 60% of soldiers between the ages of twenty-one and forty years suffered from arteriosclerosis, mostly involving the coronary arteries. Apparently arteriosclerosis is not necessarily progressive, and is often cured. It does not necessarily occur in old people, and it is often found in young people. Clinically, the tonoscillogram shows the volume of the pulse and the pressure of the blood vessel itself as well as the blood pressure. In the early stages of arteriosclerosis a variable blood pressure is noted, due to atony of the vessels. Arterial spasm is clearly recognized as causing many symptoms, including *angina pectoris*. The spasm is always preceded by a dilatation. An elevated diaphragm and meteorism are often noted in arteriosclerotics; they are due to poor circulation in atonic arteries of the intestine and to an atonic state of the diaphragm. The treatment of arterial atony consists in removing the causes, so far as is possible. Secondly, the recumbent posture is essential for treatment if the signs or symptoms are at all serious. Thirdly, a nitrogen-free and salt-free diet is advised for three or four weeks each year, and a dietetic day once a week. Fresh air, mental relaxation, and Fowler's solution are also to be recommended.

#### Adams-Stokes Syndrome.

J. E. WOOD, JUNIOR (*The Journal of the American Medical Association*, April 16, 1932) describes the course of the symptoms in a patient who suffered with frequent attacks of the Adams-Stokes syndrome. The patient was a man, aged forty-eight, who was treated regularly with daily doses of 30 to 120 milligrammes of barium chloride following his first attack of this syndrome. Twelve months later he had a number of severe seizures with loss of consciousness, cyanosis and twitching, recovery in each case occurring after two or three minutes. Ephedrine, twenty-four milligrammes, was given by mouth twice a day, with complete relief from the seizures for eighteen months. The sulphate of ephedrine was the preparation used. At one time the patient was unable to obtain the drug for four days, and minor attacks began within thirty-six hours of leaving off the drug. No untoward symptoms have been observed as a result of this prolonged administration of ephedrine sulphate.

#### Narcolepsy.

H. A. COLLINS (*Annals of Internal Medicine*, April, 1932) reports two narcoleptic patients treated with ephedrine. Both received benefit. The symptomatic treatment of narcolepsy has been without result until the introduction of ephedrine. The initial dose given by Collins was 0.025 gramme administered at 8 a.m., noon and 4 p.m. Later the dose was increased to 0.05 gramme three times a day. The last dose is given early, because when given later, it proved too stimulating.



## British Medical Association News.

### NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

McCormack, Patrick Edward, M.B., B.S., 1930 (Univ. Sydney), Queanbeyan.

### Congresses.

#### THE AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE TWENTY-FIRST MEETING OF THE AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE was held at Sydney during a period of eight days, commencing on August 17, 1932. The Congress was comprised of the following Sections: Astronomy, Mathematics and Physics, Chemistry, Geology, Zoology, History, Anthropology, Economics, Statistics and Social Science, Engineering and Architecture, Medical Science and National Health, Education, Psychology and Philosophy, Agriculture and Forestry, Veterinary Science, Botany, Physiology and Experimental Biology, Pharmaceutical Science, Geography and Oceanography.

This report is confined almost entirely to a consideration of the activities of the Section of Medicine and National Health.

The President of the Congress was His Excellency Sir Hubert Murray, Lieutenant-Governor of Papua.

#### Australia's Problems in the Tropics.

In his address as President of the Section of Medicine and National Health, Dr. R. W. Cilento pointed out that the tropical portion of Australia and Australia's tropical dependencies made up the largest tropical possession within the British Empire and contained a larger purely white population than any other tropical country. With the exception of a small and unimportant area in Central Australia, there was no part of the Australian tropics where the rainfall was less than ten inches annually; in most parts it was twenty to thirty inches, and in the Innisfail district of North Queensland there were places which had a rainfall among the heaviest of all in the settled areas of the world. The total area of the tropical portion of Australia and Australia's tropical dependencies was 1,332,320 square miles.

The Australian tropics were of the greatest importance to the Commonwealth, because they were within easy striking distance, as measured by incubation periods, of the world's largest endemic centres of smallpox, cholera and plague. Malaria, dysentery, yellow fever, dengue, ankylostomiasis and filariasis also deserved most serious consideration. The development of commercial aviation and the awakened interest of Asia in world commerce had added unsuspected significance to the geographical relationship.

There had been three distinct periods in the settlement of the tropical part of Australia. These might be called (i) the period of strategic dispersal, (ii) the period of economic extension with coloured labour, (iii) the post-federation period. A knowledge of each was important in an understanding of Australia's tropical problems.

During the first period, which had ended with the discovery of gold, garrisons had been established at Melville Island, Raffles Bay and Port Essington, because of the fear of the increasing commercial activities of the Dutch and the territorial hunger of the French. The soldiers at Melville Island had suffered from scurvy; during the occupation of Port Essington an outbreak of malaria had occurred. Malaria had been introduced apparently by Malays from the Dutch East Indies. Records showed that only those people in the immediate neighbourhood of the settlement had become affected. Persons engaged in

exploration work had suffered no ill effects from the tropical climate. It was apparent that there had been no indigenous disease incidental to life in the northern part of Australia during the first epoch of settlement.

During the second period of settlement, natives of the Pacific islands had been imported to work on the plantations of Queensland, as it had been believed that white men were unable to perform manual labour in such a climate. During the same period large numbers of Chinese had been introduced; in the year 1891 Chinese had numbered approximately one-tenth of the whole adult male population of Australia. It was to this influx of aliens that Australia owed its tropical diseases. The death rate among the Kanakas had been terrific, and among the white men in Queensland during this period enormously in excess of that in other Australian colonies. Dr. Cilento remarked:

Had one been looking for proof that the settlement of a tropical country was impossible to white men, one need have gone no further to find a rich store of confirmatory evidence. It is evidence, however, not of the unsuitability of the tropics for white men, but of the results that follow the introduction among them of a disease-ridden class of coloured indentured labour, when coupled with isolation, the inexperience both of managers and miners, bad and expensive food, and an incredible amount of drink. The decision that excluded coloured labour from Australia saved Queensland from that menace that has been so disastrous a factor in many other countries similarly circumstanced—the "poor white"—and permitted the establishment of the industries upon which her hopes of future prosperity are now based. It came too late, however, for the Northern Territory, where impossible conditions continued to prevail.

The federation of the Australian colonies had had a pronounced effect on tropical medicine and hygiene in Australia. Among important events had been the annexation of British New Guinea, the establishment of the Australian Institute of Tropical Medicine, the transfer of the Northern Territory from South Australia to the Commonwealth Government, the seizure of German New Guinea.

It had been shown that the endemic diseases of the tropical part of Australia were malaria, filariasis, hookworm disease, leprosy, various undifferentiated fevers, granuloma, yaws, various forms of ophthalmia and trachoma, food deficiency diseases, dysentery and typhoid fever. The problems of the native dependencies were, on the whole, the same, but the morbidity and mortality figures in those countries were much higher.

Malaria occurred in the north-west part of Australia and in two areas in North Queensland. It did not usually affect people other than those who lived and worked under primitive conditions and whose food and lodging were poor. Although malaria had become comparatively unimportant in Australia, it might become a danger if there was any sudden concentration of population in the endemic areas, or if hygienic control was slackened.

Filariasis appeared to have been introduced to Queensland with Kanaka labour in 1863. Between 1900 and 1910, the number of persons suffering from filariasis admitted to Brisbane Hospital had varied between 40 and 60 annually. McLean had found 15% of patients in the surgical wards in Brisbane Hospital infected with microfilariae, and Croll had reported an incidence of 11.5% in adults and 5% in children in hospital. The inland towns of Queensland beyond the coastal range were apparently unaffected. Elephantiasis was very rare in Queensland. Heydon's work had shown that *Culex fatigans* and *Anopheles amictus* were efficient carriers of filariasis and that *Anopheles vigilax* was slightly less efficient. *Stegomyia* was apparently unable to carry the disease. There were, however, other important problems presented by filariasis; the most important was that of treatment. There were no known means of preventing the complications of the disease nor of determining whether any attempted attack on the worm in the body had been successful.

In Queensland careful measures had been undertaken for the treatment and prophylaxis of hookworm infesta-



tion. As a consequence the incidence of the disease had been greatly decreased, and it could be claimed that the problem, so far as white people were concerned, was under control. A great deal of work had still to be done among the aborigines. Infestation with *Necator americanus*, the common hookworm in Australia and Melanesia, was not usually directly responsible for symptoms of disease, but it caused a lowering of resistance and a susceptibility to more serious diseases.

Baldwin's work in Townsville from 1922 to 1929 had revealed that the various undifferentiated fevers of the north-eastern part of Queensland included typhoid fever, paratyphoid fever, endemic dengue fever, endemic typhus fever (Brill's disease), septicemia due to *Bacillus pyocyaneus*, filarial fever, malaria and possibly others.

The steady increase in the number of known lepers in North Queensland and the Northern Territory was a pressing problem, but a problem that offered hope for a ready control.

Food deficiency diseases and trachoma still, as formerly, marked the edge of the extension of settlement, and still, as formerly, could be met only by a further extension, bringing with it the advantages and facilities of civilized conditions and adequate medical attention.

During the post-federation period in the history of Australian settlement, the Commonwealth Government had carried out, through the agency of the Division of Tropical Hygiene, a great deal of important work in tropical parts of Australia, and had established laboratories at Toowoomba, Rockhampton, Townsville, Cairns and Rabaul.

Unfortunately, just as the economic crises of the forties and nineties of last century terminated the period of strategic dispersal and the period of extension with coloured labour respectively, the crisis of the thirties of this century inevitably resulted in the termination of the active investigation of the tropical problems of Australia and her dependencies by the Commonwealth, when, with the reorganization of the Commonwealth Department of Health, the Division of Tropical Hygiene ceased to exist.

The history of tropical medicine and hygiene in Australia and its neighbourhood had followed an interesting and varying course, falling roughly into three periods; a fourth period was about to commence. The problem of the fourth period of development would be mainly the settlement of men and their wives and families on the vast tropical areas of the northern part of Australia. Experienced observers had no doubt of the ability of white persons to adapt themselves to tropical climates; as far as tropical diseases were concerned, Manson had pointed out many years ago that the more learnt about them, the less important the rôle of temperature *per se* and the more important the influence of the tropical fauna. The successful colonization of the tropical parts of Australia, the great problem before the present generation, was essentially a problem of applied public health.

#### Leprosy.

DR. E. H. MOLESWORTH read a paper entitled: "The Influence of Natural Selection on the Incidence of Leprosy and Other Infectious Diseases." In introducing his subject, Dr. Molesworth remarked that he did not claim a great knowledge of evolutionary laws and that he chose to read his paper before the congress in the hope that he might reap the benefit of the advice and correction of people better qualified than he was to discuss the laws of natural selection.

There was active opposition to the view that natural selection was an important factor in the phenomena marking the behaviour of disease. In part this was due to the fear that acceptance of the doctrine of natural selection might interfere with the measures that were now being undertaken to eliminate certain diseases. But, of course, a belief in the influence of natural selection did not exclude belief in the efficacy of modern methods of hygiene, sanitation and treatment. Dr. Molesworth declared his belief that natural selection had been an important if not the most important factor in causing the disappearance of leprosy from Europe.

Certain infectious diseases were checked and limited by artificial immunization, others by the free use of adequate therapeutic measures; but other diseases had died out or almost died out in certain countries without the introduction of scientific measures. There was no more remarkable instance of this than the behaviour of leprosy in Europe. Leprosy had flourished in Europe between the years A.D. 500 and 1200, but had almost completely died out by the year 1500, save in Scandinavia and certain isolated communities. There was evidence that Norway and the Shetland Islands had been infected later than England, and it was significant that leprosy had only recently disappeared from the Shetlands, and still occurred in a moribund condition in Norway. Leprosy had been introduced by Chinese into Australia in the days of the Victorian gold rush; but no European had become infected; introduced later into the Northern Territory, it had played havoc with the aborigines. Dr. Molesworth asked why Europeans had not been infected in Victoria and why epidemics did not occur in certain European cities where no efforts at the segregation of lepers were made. Two main reasons had been suggested: (i) the supposed efficacy of the mediæval regulations against leprosy, (ii) improvements in housing, hygiene and nutrition.

Modern opinion was that, even when aided by the most satisfactory therapeutic and diagnostic methods, isolation was useless, save in those few communities in which absolute control was possible. How, then, could the absurdly inadequate mediæval measures of segregation have had an influence on the incidence of leprosy?

There could be no doubt that improvement in housing, hygiene and nutrition had an influence in diminishing the ravages of leprosy or any other infectious disease; but it was quite another thing to believe it capable of eradicating leprosy from Europe. In fact, leprosy had died out in many places long before the institution of reforms in housing and hygiene. In France at the time of the Revolution the peasants had lived under conditions of misery and squalor, yet leprosy had disappeared from all parts of France, save Brittany, centuries before.

Muir believed that the "black death" had been largely responsible for the eradication of leprosy from England, on the grounds that: (i) it had resulted in a thinning out of the population, (ii) it had been followed by a scarcity of labour and consequent increase in wages and improvement in the standard of living. Dr. Molesworth did not believe that the "black death" could have played nearly so important a part. It had been shown within recent years that leprosy could spread with alarming rapidity in a sparse population. Furthermore, there was ample evidence that the population of Norway had been reduced by one-third by the "black death"; yet the disease had continued to flourish in Norway. No doubt living conditions had improved after the subsidence of the "black death", but they had still been very bad, certainly much worse than living conditions in Scandinavia in the nineteenth century, when leprosy still prevailed there.

Dr. Molesworth remarked that Liveing, in 1873, had been the first to suggest that racial resistance to leprosy could be raised by the elimination of susceptible stock. Liveing's views had not been generally accepted. The laws of natural selection were now sufficiently firmly established to justify the application of them in deduction. Two premises were necessary: (i) that variations existed in the degree of natural resistance or susceptibility to leprosy and to other chronic infectious diseases; (ii) that natural resistance or susceptibility was a characteristic that was transmissible by heredity. In this regard, Topley and Wilson had shown that the average resistance of members of an animal herd was raised by the introduction of mouse typhoid and other diseases. There was no reason to believe that mankind differed from other herds in its susceptibility to the operation of the laws of natural selection, or that leprosy differed from other infections in suitability for use by Nature as a comb to eliminate the susceptibles. It was evident that natural resistance to various microorganisms existed, otherwise man's body would "be simply a tube of culture medium on which the bacteria would grow until its power to supply nutriment was exhausted". It was evident also that this natural resistance was present in some degree in all men of all

generations. It was therefore an innate and heritable quality and belonged to the category of Darwinian characteristics. The degree of natural resistance to infection varied as did other heritable characteristics.

An illustration of the possible variability in the degree of natural racial resistance was an epidemic of leprosy in Nauru. The incidence of the disease in this epidemic had been very high (30% of the inhabitants had been infected); 90% of those infected had suffered only from the mixed or anæsthetic form of the disease. Thus in a country into which leprosy had been introduced as a new disease, the great majority of the people had resisted infection; many more had possessed sufficient powers of resistance to protect them from the most dangerous type of the disease; a minority had possessed small powers of resistance and had been attacked by severe nodular leprosy.

When a disease such as leprosy became prevalent in a community, the people with low resistance and their descendants were gradually eliminated; the progeny of the more resistant survived in greater numbers; as generation succeeded generation, susceptible individuals were weeded out, so that the average resistance of the surviving stock progressively increased. This, of course, was not the whole story; as generations passed, the disease became less severe and less prevalent; surviving highly susceptible persons were less likely to come in contact with the more infective types of the disease; and there were other considerations.

The racial reactions to measles were analogous to the racial reactions to leprosy. Measles occurred and caused a low death rate only in those communities in which it had existed for centuries; but when the disease was newly introduced into a country it caused great havoc. A great many moderately susceptible subjects survived measles; the highly susceptible died and left no progeny; thus the average resistance was gradually raised. The moderately susceptible were influenced little by natural selection, because they survived, bred, and transmitted moderate susceptibility to their progeny.

The same thing that had happened with leprosy in the thirteenth and fourteenth centuries was apparently happening with tuberculosis today.

Finally, Dr. Molesworth discussed the history of leprosy in Europe, and pointed out that there was no feature of this history that was not explicable by the theory of natural selection.

PROFESSOR HARVEY SUTTON read a paper entitled: "The Disappearance of Leprosy from Great Britain." This will be published in full in a later issue.

#### Malocclusion of the Teeth.

MR. ARTHUR THORNTON TAYLOR read a paper entitled: "The Significance of Malocclusion and Irregularity of the Teeth in Relation to Public Health."

Mr. Taylor pointed out that two-thirds of children between the ages of four and six years were affected with malocclusion or irregularity of the teeth. Many investigators were of the opinion that malocclusion and irregularity of the teeth were really a congenital condition. It had been shown that there was considerable variation in the types of jaws at birth. Certain observers believed that, as a result of disuse and other factors, the jaws of civilized man were tending to become smaller; malocclusion was a natural sequel of this. Certainly, malocclusion was to be observed in some primitive skulls, but to nothing like the extent observed in the skulls of civilized people. As shown by Campbell and by Waugh, the teeth of primitive people became worn into uniform "planes of attrition" and were remarkably free from disease.

Mr. Taylor discussed the various theories of causation of dental caries, paying particular attention to the theory of "traumatic occlusion" and the dietetic theories. He pointed out that no conclusion could be drawn from a consideration of the results of investigations into the influence of diet from a biochemical standpoint.

Proceeding to a consideration of the etiology of *pyorrhæa alveolaris* (or periodontoclasia), Mr. Taylor pointed out that irregularity and malocclusion were of importance; for irregularity caused stagnation or prevented easy

removal of food from the gingival trough and interdental spaces, and so contributed to gingival inflammation and its sequelæ; irregularity of the teeth also allowed retention of deposits on, or prevented easy removal of deposits from, the teeth.

Mr. Taylor went on to say that the prevention of malocclusion, with its attendant evils of dental caries, oral sepsis and ill health, depended upon: (i) the promotion of normal growth of the jaws to allow the normal placing of the teeth; (ii) the employment of such a diet that would demand the exercise of an efficient masticatory function and so cause a wearing of the occlusal surfaces of the teeth into a "plane of attrition", so that trauma would be eliminated by the wearing down of "traumatic areas" on the tooth surfaces.

Mr. Taylor discussed the association of malocclusion, oral sepsis and general health, and concluded with a repetition of the assertion that prevention was a matter of diet.

#### The Hygiene of Swimming Pools.

DR. E. S. STOKES read a paper entitled: "The Hygiene of Swimming Pools." He remarked that in Sydney public swimming pools were "everything that they should not be". In order to appreciate the rationale of the various measures to insure cleanliness, it was necessary to realize that swimming pools were places for exercise and pleasure, and not washing or cleansing places. Swimming was one of the most valuable forms of exercise. In order that great numbers of people should be enabled to obtain the full benefit of this exercise, the water in the pools should be of high quality; the pools should be full, not of dilute sewage, but of fresh, clear and sparkling water, free of all harmful bacteria.

In the report of an investigation made on behalf of the English Ministry of Health in 1929, it was pointed out that there was evidence of the occasional transmission of disease by the water in swimming baths. Gastro-intestinal infections were seldom transmitted; but the occurrence of a small epidemic of enteric fever at Walmer was recorded. This epidemic had been caused by pollution of a sea water pool by outfall sewers; there had been no system of purification of the water. Furunculosis, scabies, tinea and pediculosis were probably transmitted by towels, costumes and seats rather than by water. Conjunctivitis, often conveyed by towels, was undoubtedly sometimes spread by the water itself. Nasal catarrh, sinusitis and tonsillitis could be transmitted from an infected to an uninfected person in the water, especially in crowded baths. There had been numerous instances in which middle ear disease had been due to swimming.

Dr. Stokes pointed out that pollution in swimming pools might be derived from the bathers themselves or from other sources. Contaminated water might be used for filling the pool; dust and soot might be blown in; unless the passages and paths were properly designed, filth might be carried in on the shoes of bathers, spectators or staff. A great deal of pollution was derived from swimming costumes; it had been stated that the average number of bacteria per square inch of a swimming costume after use was 150,000, but that sometimes the number reached 1,000,000. From a point of view of health, the most serious pollution came from the hair, skin, mucous membranes and urine of the bathers.

Pollution was of three kinds: (i) particulate matter, including fragments of recently discharged mucus; (ii) matters in solution; (iii) bacterial pollution, which might be large, even in waters that appeared attractive. The first two formed a suitable culture medium for the bacteria at a temperature of 22.2° C. (72° F.), the usual temperature of the water in indoor swimming pools.

Artificial and partly artificial swimming pools were of four main types: (i) large semi-artificial pools in which cleanliness was maintained by natural flow; (ii) pools in which cleanliness was maintained by a periodic change of the water; (iii) pools through which there was a constant flow of water from some natural or artificial source; (iv) pools in which circulation of water was made by pumping and to which the outflow water, clarified by filtration, was returned. Dr. Stokes remarked that proper sanitary practices were applicable to all

classes of pools and all should be placed under the sanitary control of public health authorities. The pool and its adnexa should be so designed as to necessitate each bather's passing the privy and shower baths in proceeding from dressing room to pool.

There should be a separate entrance to the dressing room from the pool. If possible, the pool should be lined with tiles or glazed bricks. Water removed from the pool should be strained and filtered. Rapid filtration through sand was usually employed. This method necessitated the use of a precipitating medium—sulphate of alumina—to which an alkali was added to prevent acidity of the water. Chlorination was the recognized method of sterilization of the water; the application of ozone and ultra-violet rays had also been employed. Dr. Stokes remarked that the character of water in swimming pools at all times and under all conditions should be in accord with the following requirements: (i) It should contain between 0.2 and 0.5 part per million of free chlorine; (ii) it should be alkaline, but free of caustic; (iii) it should be sufficiently clear to allow a bright platinum wire, one millimetre in diameter, to be seen at a depth of six feet; (iv) it should be well aerated, sparkling, and attractive in appearance. Pure water was blue in colour, whereas water usually supplied to the community was brownish; the treatment suggested for the water of swimming pools removed the brownish colour.

An expert committee in the United States of America had made numerous recommendations, among which were the following:

At indoor pools used exclusively by men, nude bathing should be required; in those used by women only, bathing suits should be of the simplest type. All suits and towels should be supplied and cared for by the management.

All bathers should be required to wear rubber caps.

All bathers must take a cleansing shower bath before entering the pool. Bathers should be instructed to use the privy before entering the pool. A bather who leaves the pool for a brief period should use a foot bath before returning; if he evacuates the bowel or bladder, he should bathe the whole of his body.

An attendant should be on duty to inspect the bathers for obvious skin lesions before they enter the pool. Any persons with such lesions, sore eyes, nasal or aural discharge, or any communicable disease, should be excluded from the pool.

Spitting, blowing the nose, or spouting water in the pool should be prohibited.

In conclusion, Dr. Stokes drew a comparison between the modern swimming pool and one of Sydney's public pools. The former, lined with white tiles, contained water that was bright and clean and so clear that a pin could be seen on the bottom at the deepest part, and it was surrounded by fittings conforming to the highest sanitary standards; the Sydney pool was in dirty and slovenly surroundings; its walls were dark and begrimed; its water was the colour of weak tea and was so thick that nothing could be seen a foot or so through it, and the bottom was a lost region.

MR. WEEKS discussed the construction and methods of managing a swimming pool from the engineering standpoint. In the course of his discussion he remarked that, at the end of a period of months, the water of a certain pool in New South Wales was champagne-like in appearance and was actually sought for drinking purposes, though it had never been changed, and the only fresh water added had been such as had been required to keep the pool full.

#### The Preparation, Handling and Storage of Food.

MR. W. SINCLAIR read a paper entitled: "The Vehicles of Refrigeration." He pointed out that a century ago Michael Faraday had succeeded in liquefying carbon dioxide by mechanical means. Faraday's work was the foundation of modern refrigeration, but no commercial use had been made of his discoveries until the sixties of last century.

In certain countries the prevailing winds deposited their surplus vapour as they swept over icy mountain ranges;

as they reached the habitable zones at a lower altitude their temperature was raised while their humidity remained relatively low. In this way Nature provided an atmosphere suitable for the preservation of foodstuffs. In an ordinary refrigerating chamber the air was practically always at dew point, and readily deposited moisture on walls and fittings and contents; this was undesirable. In some instances efforts had been made to imitate Nature by cooling to a lower temperature than necessary, then raising the temperature.

Mr. Sinclair briefly discussed the principles of "quick freezing", a method possessing certain advantages, especially with regard to the preservation of flavour, over older methods. The water in the cells of food contained a large part of the material that gave the food its flavour. The retention of flavour appeared to depend on crystal growth in the cells; the size of the crystals depended on the rapidity of the freezing. The thawing was of greater importance than the freezing; it was necessary so to control the thawing that the cells were not ruptured and the water containing the flavouring substances did not escape. Mr. Sinclair pointed out that the "quick freezing" method was more successful when small articles of food were treated; the "quick freezing" of quarters or sides of beef had not been entirely satisfactory.

The preservation of fish by freezing was often unsatisfactory in semi-tropical regions. This seemed to be due to the temperature at the time the fish was caught and the conditions during the transport of the fish to the freezing establishment.

In conclusion, Mr. Sinclair drew attention to the necessity, on the grounds of economy, for the careful study of refrigeration in Australia.

At the commencement of his paper, "Modern Improvements in the Preparation, Handling and Storage of Food", Dr. E. Sydney Morris drew attention to the fact that only a quarter of a century had passed since the institution of any adequate control of food in any country. The first measures had been undertaken in the United States of America; the various Australian States had followed the lead within a year or so. No legal enactment had produced greater benefits for the public health than the *Pure Foods Act*; the good results had been obtained in comparatively few years. Australians were among the most fastidious peoples in the world in regard to their food.

Many of the so-called improvements introduced within recent years did not improve the value or increase the purity of food. Attempts to "get back to Nature" in the matter of diet were prevented by the commercial chemist. The chemist provided numerous reasons why a synthetic vanilla, for example, should be used in preference to the natural product. The chemist introduced an electrical process for the bleaching of flour when the health authorities prohibited bleaching by chemical means; actually, the final effect of the electrical process was a chemical reaction; but the public rapidly learned to appreciate the superlatively white loaf, and another capitulation was made to the chemist. One effect of the *Day Baking Act* was that dough was not given sufficient time in which to rise; substances were introduced to increase the rate of rising; one of these, persulphate of ammonia, caused dermatitis of the arms of bakers who possessed an idiosyncrasy to it. Ice cream was sold by volume; it was possible to increase the bulk by the introduction of air into the mixture. This was known as "swell"; such "swell", or, more accurately, air, was purchased as ice cream by the public. The manufacturer declared that the public received value for its money, and the chemist certified that in no other way but by the addition of "swell" could a high class product be made.

Dr. Morris proceeded to discuss the transport and sale of milk. The bottling of milk was a practice that was growing rapidly and seemed destined to become more or less general. The public seemed to have acquired the belief that milk in a bottle must be good because it looked clean and had a nice label. Until it was possible to enforce by law the type of bottle, the type of cap for the bottle, and the licensing of premises for bottling, it was likely that bottling of milk would be one of those alleged



improvements that were a "delusion and a snare". The cap should cover the whole top of the bottle so as to exclude dust, and should be of such a type that it could be fitted only by special machinery. The method in general use at present in Sydney, of inserting a cardboard disk into the neck of the bottle, gave opportunities for the milk carter to fill a used and unwashed bottle and to insert a stopper carried in his pocket, in order to satisfy the demand for bottled milk when his supply had run short.

During the past ten or fifteen years, pasteurization of cream for the manufacture of butter had become universal in New South Wales. Improved methods of manufacture, together with the refusal of English health authorities to permit use of preservatives in butter, had been responsible for the elimination of boric acid from the butter manufactured in this State. Pasteurization was being employed in the preparation of milk for the manufacture of cheese.

Dr. Morris described briefly the process of bread manufacture, in which handling was almost entirely eliminated. He then went on to discuss the wrapping of bread. Normally, bread was subjected to much handling between the factory and the home, and was liable to contamination at many points in its journey. One firm in New South Wales had installed an expensive automatic bread-wrapping machine, but had been forced to discontinue the experiment of bread wrapping on account of the provisions of the *Day Baking Act*. Bread could not be wrapped until the lapse of two and a half hours from the time it was removed from the oven; otherwise its heat melted the wax of the paper wrapping. The bread carters employed by this particular firm had been forced, therefore, to remain on their rounds beyond the regulation time. Within the space of two months the firm had been prosecuted for some sixty breaches of the awards. Another public health dream had been shattered.

In discussing refrigeration Dr. Morris remarked that meat exported from Australia was frozen, whereas that from the Argentine was chilled. When a large mass of frozen meat thawed, it exuded free fluid, or "drip", which carried with it dissolved salts, muscle pigments *et cetera*. It had been found that "drip" could be eliminated only if freezing was practically instantaneous. "Drip" occurred if ice was formed outside the muscle fibres. As it was practically impossible to freeze large masses of meat instantaneously, it appeared that Australia might always be at a commercial disadvantage in the overseas markets.

The older methods of canning food depended almost entirely on the application of heat for the purpose of sterilization and of creating a vacuum in the container. The container was hermetically closed while the food was still hot within it. The exclusion of air was necessary to inhibit the growth of any bacteria that might not have been killed in the cooking. In modern methods cans were sealed or glass containers were fitted with a cap and gasket in a vacuum sealing machine. All air was sucked out of the machine by means of an exhaust pump. Heat and steam pressure were sometimes applied afterwards. The following conditions were necessary in modern canning: (i) the minimum initial bacterial contamination; (ii) conditions within the factory that would allow a minimum of bacterial multiplication; (iii) the application of sufficient heat for the destruction of all organisms save perhaps a few spores; (iv) a satisfactory form of container and reliable methods of closure.

The use of chemical preservatives in food was to be deplored; but its entire prohibition had been found impracticable. Fortunately, the use of modern methods had obviated the necessity for chemical preservation in many instances. The use of salicylic acid as a preservative had been prohibited. Dr. Morris mentioned that by a special Act of Parliament the preservation of meat by sulphur dioxide was permissible in New South Wales. So far, no meat so treated had been offered for sale.

Dr. Morris went on to discuss the prevention of contamination of food. He said that in modern factories handling had been greatly reduced, and clean machines performed most of the work. Non-corrosive metals were employed, and joints and seams were eliminated. In the United States of America medical examination of employees in food factories had been introduced. The

practice had many shortcomings. It had been found in the United States of America that certificates supplied by general practitioners were not reliable. A large medical staff was therefore necessary. Even then medical examinations could not be conducted more frequently than every six months. During the intervals there was ample time for the development of various diseases. For example, a person might be passed as healthy one day, develop gonorrhoea the next, and be a potential source of danger until his next examination.

Dr. Morris closed his paper with a brief discussion of the vitamins. He remarked that the evidence available appeared to show that neither freezing nor canning affected vitamins A and B, but that the fate of vitamins C and D seemed uncertain.

#### Physiological Standards.

PROFESSOR HARVEY SUTTON read a paper entitled: "Australian Physiological Standards." Professor Sutton pointed out that, though a good deal of work had been done, knowledge of Australian standards of health was still incomplete. It was too frequently assumed that figures obtained in other countries were applicable to Australian conditions. In a paper read by Professor H. G. Chapman before a meeting of the Association in Hobart, unexpected differences between Australian and overseas standards were revealed. No figures were available to show the normal period of pregnancy of Australian women; the pelvic measurements of the normal healthy Australian woman were unknown. Generally there was a striking lack of knowledge concerning the conditions in health of children and adults.

Professor Sutton's paper embodied the information obtained recently by Dr. Clements as the result of an investigation into the rate of growth of healthy infants in Sydney. Professor Sutton showed charts on which the growth curve of infants in Sydney was plotted, alone and in comparison with the findings of other observers.

Professor Sutton said that investigation of the growth and physical condition of school children had shown that rural children were approximately three months in advance of city children in the matter of increase in height and weight, and that the Australian-born child of Australian parents was a better physical specimen in regard to stature and weight than the Australian-born child of overseas parents. Professor Sutton hoped soon to obtain data relating to the effects of the Great War on Australian children; an investigation should also be conducted into the behaviour of successive generations of Australians after the war. In this study it was hoped that the following would be noted: the place of the child in the family, the influence of accommodation, the prevalence and influence of physical defects. It might also be possible to observe the behaviour of the Australian in different geographical environments.

A knowledge of the normal standards for healthy Australian people could be put to useful purposes. The psychologist was able to estimate a child's mental age with some accuracy; no estimation was at present possible for physiological age. Such an estimation would be possible if the following data were available for each age: height (or, better, stem length), weight, chest girth, head capacity, vital capacity, grip, dental eruption, secondary sex characters, ossification (determined radiologically), and basal metabolic rate. It was sometimes the duty of a medical practitioner to decide whether a boy under the age of sixteen years was fit to undertake a particular occupation. In such circumstances the medical practitioner had to depend on his common sense and experience, whereas he should be able to estimate the boy's physiological age. Disease and defect could be defined as such only when comparison was made with the normal. When an effort was made to discuss any of the great factors, such as housing, diet, sunshine, that might influence human well-being, the normal should be known.

Professor Sutton touched on some others of the numerous features of healthy persons that should be known and understood; he concluded as follows:

More and more it is desired that physiological standards and psychological standards should be cor-

related. It would surely be better if we could contrast the mental age, not only with the birth age, but with the physiological age. On the principle that classification is the basis of progress in the scientific method, physiological standards are our first requirements in that procedure. Growth is the test of health, and physiological standards the basis of preventive medicine and national health.

#### The Psychopathology of Childhood.

PROFESSOR W. S. DAWSON read before a meeting of the Section of Education, Psychology and Philosophy a paper entitled: "The Psychopathology of Childhood". In introducing his subject Professor Dawson briefly discussed the development of normal function and structure during the first few years of life. He pointed out that it was convenient to distinguish various stages in mental development; a differentiation had been attempted by Van Monakow. The earliest stage was one of purely instinctive and vegetative life, when the infant's vague consciousness was concerned with elementary feelings of comfort and discomfort, and when vocalization assumed no more than an instinctive signal of distress. Systematic training in the elementary physiological functions should be given during this stage.

In the second period there were the discovery of orientation and the development of coordination of movements and sensations.

The third period occupied the latter part of the first year of life. It was marked by the development of a response to environment, a recognition of other persons, the expression of love and fear, and response to commands. During this period the infant became responsive to emotional environment, and its behaviour was often a striking reflexion of the emotional state of those with whom it was closely associated. Jung had remarked:

The father and mother impress deeply into the child's mind the sense of their personality, the more sensitive and mouldable the child, the deeper is the impression. Thus, even things that are never spoken about are reflected in the child.

The fourth period was the period of the symbol, especially the symbol of speech. In this period, which extended to the third year, there were the beginning of the desire for affection and praise, a strengthening of the feeling for the prohibited, the development of the feeling of guilt and punishment, the development of the feeling of affinity and gratitude.

In the fifth or school period there were development of the appreciation of moral values, understanding of industry, appreciation of the noble, judgement of naughtiness, desire for extraordinary accomplishments, strengthening of the foundations of personality, awakening of ambition by competition with comrades.

In the sixth stage, puberty, there was introduced a lively interest about sexual matters. A stronger emphasis was placed on the personal future; there were longing, hope, striving for reward, eager cultivation of companionship, the development of a conception of honour and sense of justice, the development of an understanding of social obligations. This period lasted from the age of about thirteen to eighteen years.

Professor Dawson pointed out that in a series of one hundred adult patients of average intelligence suffering from depression as an outstanding symptom, a considerable number had possessed mental nervous traits for years before the development of the incapacity demanding their treatment in a psychiatric hospital. In no less than twenty-three cases there had been a history of psychopathic disposition in childhood.

Professor Dawson discussed *dementia præcox* in its association with the signs of mental abnormality in childhood, and stressed the necessity for the exertion of endeavours to prevent the disease rather than to treat it in its later stages.

In discussing neurosis in childhood Professor Dawson remarked:

It is curious that educational authorities have for some time now undertaken a largely self-imposed task of providing for the physical examination of school

children and even for their clothing and nutrition without paying equal attention to the emotional state. Are not our schools devoting too much effort to the driving in of facts, education in the narrow sense, and too little to the socialization of the child?

Professor Dawson briefly discussed the problem of the backward child, then proceeded to a consideration of the problem of sexual activities in childhood. Stimulation of the genital area was only one of a group of undesirable performances. Parents should be taught that the child's awareness of its genital organs, as of other parts of its body, was aroused from purely physiological causes, though, of course, there might be some pathological conditions discoverable by general medical examination. A habit was most likely to become established when the undesirable conduct, whatever its nature, gave rise to emotional reaction on the part of the parent. Often such habits were acquired by children who had not sufficient outlets for their energies and obtained insufficient amusement, exercise and companionship. The devil seemed to have a special liking for the lonely child.

Closely allied to the treatment of bad habits was instruction concerning sex; this instruction was essentially the duty of parents and should be made at any age and in appropriate terms whenever the child developed curiosity. Professor Dawson remarked that the problem of sex was never isolated and could not be detached from that of the general adaptation of the individual.

In conclusion, Professor Dawson, after dealing briefly with delinquency, discussed the constitution and function of child guidance clinics.

#### Depopulation.

SIR HUBERT MURRAY read a paper entitled: "Population Questions from the Standpoint of Administration." Sir Hubert Murray remarked that he could see no evidence that the population of Papua one hundred years ago had been either greater or less than it was at the present time; it might have been either. In the Eastern Division and South-Eastern Division of Papua, however, the population was declining. Various theories had been advanced in regard to the causation of this decline; an interesting attempt at solution of the problem had been made by the members of the native staff of the Anglican Mission. They had mentioned four main factors: (i) a general shortage of food; (ii) a desire to make the most of such food as there was by a display at feasts; (iii) the opinion, general among the women, that their children were killed by evil spirits and that it was useless to bear them; (iv) a strong public opinion that there was something disgraceful in having a large family. All these causes were quite independent of settlement by white people and had probably been in operation always.

The inadequacy of food supply was probably an important factor in depopulation; so too was the psychological factor, which had been stressed by anthropologists. The anthropologist argued that the native lost heart and succumbed readily to illness when his old customs were taken from him with the advent of European civilization; the medical observer believed that the loss of heart was an effect, not a cause, of the ill health, and that the interference with native custom had comparatively little to do with it. Certainly it had been shown that natives could flourish and multiply although their ancient customs had been entirely abolished.

Probably the interaction of the three causes—insufficient food supply, sickness, and the passing of the old native life—was the cause of depopulation; but the form of interaction was not the same in all cases.

A good deal had been said about the influence of the system of indentured labour on the birth rate. Doubtless the effect of the absence of a number of young men from a community for a period of twelve months or more would have some effect on the birth rate; but Sir Hubert Murray did not think it would have much, "no more effect probably than the compulsory military service of the youth of Germany upon the birth rate of that people".

In conclusion, Sir Hubert Murray remarked that he did not think there was reason for a pessimistic view concerning the population of the countries of the Pacific, and, as

far as Papua was concerned, some tribes would possibly succumb altogether, but the more resistant stocks would remain, and their natural increase would be more than sufficient to make up any loss.

On behalf of Dr. T. WI REPA, Dr. RAYMOND FIRTH read a paper entitled: "Depopulation in New Zealand." Dr. Wi Repa pointed out that in the year 1769, at the time of Cook's visit, the number of the Maoris was estimated at between 150,000 and 200,000. At one time during the nineteenth century the figure had dropped to 40,000, but in 1900 it had risen to 43,143; the latest figure was 69,000. The causes of Maori depopulation were war, pestilence, sterility, infant mortality and the loss of ancestral lands. The years between 1810 and 1835 were famous in Maori traditions as the period in which the lust for bloodshed had become a striking trait in the characters of the great chiefs. During this period guns had been used in tribal warfare. Many had been killed and many more enslaved.

Dr. Wi Repa mentioned a pestilence, *rewharewha*, which had accounted for the death of many people in the year 1875. The nature of the illness was unknown; possibly it had been measles or influenza. Of other diseases that contributed to depopulation, Dr. Wi Repa laid particular stress on tuberculosis.

Dr. Wi Repa was of the opinion that venereal disease contributed largely to the sterility of the Maoris. Inbreeding probably also had an effect on fecundity.

Rural depopulation was caused partially by the loss to the Maoris of their ancestral estates. The members of the dispossessed tribes became scattered abroad; they felt that they had been forced to desert their traditional breeding ground. These people did not breed so prolifically after removal from their old countryside.

Dr. Wi Repa said that if any section of the Polynesian race was to survive in the presence of a powerful civilized people, like the Anglo-Saxons, it must embrace all the advantages offered to it, such as sanitation and education, and all that these advantages meant.

Mr. E. W. P. CHINNERY read a paper entitled: "Census and Population." He pointed out some of the many difficulties in the way of accurate census-taking in Melanesian countries, such as the Territory of New Guinea. He outlined a means of obtaining records that were as nearly accurate as possible. Disease had been the chief factor in depopulation in the areas he had visited. Mortality could be reduced by intensive medical supervision, a properly organized scheme for infant welfare, the introduction of new food plants, and instruction in scientific methods of cultivation.

Dr. RAYMOND FIRTH read a paper entitled: "Some Indices of a Stable Population." Dr. Firth discussed particularly the natives of the island of Tikopia. In this island the population tended to increase, and the inhabitants had their own methods of limiting it in accordance with economic requirements. These measures consisted in celibacy, contraception, abortion and infanticide. The island was isolated and appeared to be singularly free of serious endemic disease. Malaria did not occur there, and frambesia was uncommon. The only epidemics occurred after the occasional visit of a vessel. The population of Tikopia was in a condition of economic and social equilibrium. In Dr. Firth's opinion it should not be interfered with.

PROFESSOR S. H. ROBERTS and Dr. H. IAN HOGGIN read papers entitled: "Causes of Decline of Native Population in the Western Pacific." Professor Roberts discussed the question from the historian's point of view, and Dr. Hoggin from the anthropologist's.

PROFESSOR J. MACDONALD HOLMES read a paper entitled: "Geographical Aspects of the Population Problem." Professor Holmes showed maps revealing the distribution of population and the extent of the export trade of the countries in the Pacific Ocean. The most thickly populated countries and the countries in which natural resources had been most fully developed were those along the trade routes.

On behalf of Mr. F. E. WILLIAMS, Dr. RAYMOND FIRTH read a paper entitled: "Population and Administration." In discussing the modern factors in depopulation, Mr. Williams remarked: "I am ready to believe that introduced

disease is the most important, and consequently depopulation is primarily, though, of course, not solely, a medical problem." Some factors, such as infant mortality, had operated for many generations; but infant mortality was one that could and should be greatly reduced. Mr. Williams remarked in conclusion that there was still uncertainty concerning the major causes of depopulation. He believed that agricultural and horticultural reform offered the best hope of prevention of continued depopulation.

Dr. R. W. CILENTO read a paper entitled: "The Value of Medical Services in Relation to Problems of Population." This paper will be published in full in a later issue.

On behalf of Dr. W. M. STRONG, Dr. W. SAWERS read a paper entitled: "Food Deficiency in Native Population." This paper will be published in full in a later issue.

Dr. A. P. ELKIN read a paper entitled: "Cultural and Racial Clash in Australia." In his conclusion Dr. Elkin remarked:

If the aborigines cannot or will not attain to our manner and view of life, we must evolve some policy which will enable them to play a part in the life of the country that will be of advantage to themselves and to us, and at the same time will allow them to live their lives apart as a distinct race.

#### Diphtheria.

Dr. A. R. SOUTHWOOD read a paper dealing with the diphtheria problem. This will be published in full in a later issue.

### Diary for the Month.

- SEPT. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
- SEPT. 7.—Victorian Branch, B.M.A.: Branch.
- SEPT. 7.—Western Australian Branch, B.M.A.: Council.
- SEPT. 8.—New South Wales Branch, B.M.A.: Clinical Meeting.
- SEPT. 9.—Queensland Branch, B.M.A.: Council.
- SEPT. 13.—New South Wales Branch, B.M.A.: Ethics Committee.
- SEPT. 20.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- SEPT. 21.—Western Australian Branch, B.M.A.: Branch.
- SEPT. 23.—Queensland Branch, B.M.A.: Council.
- SEPT. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
- SEPT. 28.—Victorian Branch, B.M.A.: Council.
- SEPT. 29.—South Australian Branch, B.M.A.: Branch.
- SEPT. 29.—New South Wales Branch, B.M.A.: Branch.

### Medical Appointments.

Dr. J. C. Halliday (B.M.A.) has been appointed Honorary Ophthalmic Surgeon, The Coast Hospital, New South Wales.

### Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

ADELAIDE CHILDREN'S HOSPITAL (INCORPORATED), ADELAIDE, SOUTH AUSTRALIA: Medical Superintendent.

BALONNE HOSPITAL BOARD, QUEENSLAND: Medical Officer.

DEVON PUBLIC HOSPITAL, LATROBE, TASMANIA: Surgeon Superintendent.

HOBART PUBLIC HOSPITAL, HOBART, TASMANIA: Junior Resident Medical Officer.

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

THE BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Acting Honorary Dermatologist.